TROPICAL DISEASES BUREAU.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

APPLIED HYGIENE IN THE TROPICS.

By Lt.-Colonel W. Wesley Clemesha, C.I.E., I.M.S. (retd.).

Supplement No. 2.] 1924. [June 30.

DISEASE PREVENTION.

Rockefeller Foundation. **International Health Board. Ninth Annual Report, January 1, 1922-December 31, 1922.** [Rose (Wickliffe), General Director.]—pp. xix+169. With 64 figs. Jan. 1923. New York: 61, Broadway.

The year 1922 was one of very great activity for the International Health Board of the Rockefeller Foundation. It is quite impossible to deal adequately with the various spheres of usefulness, but a few of the charts and pictures are reproduced (Figs. 28, 29 and 30). On the subject of hookworm disease a map of the activities in Siam is given and also a diagram for the Vere area in Jamaica showing the results of an extensive campaign of treatment. In the sphere of research Dr. Cort's work may be mentioned.

"He and his associates have been able to show that it is a common thing in nature for the larvae to complete their second moult and lose the sheath in the soil, and that such larvae are infective then as well as when sheathed. Their studies also indicate that while swine are to be regarded as important disseminators of the parasite, the activities of chickens are on the whole more beneficial than harmful."

According to this authority the larvae do not live longer than 6 weeks under the conditions prevailing in summer in Trinidad and British West Indies, but they are capable of traversing 3 ft. of light sandy loam. The work is confirmed by Dr. Hampton in Ceylon; hookworm larvae buried at a depth of 12 in. will find their way to the surface in about 5 days.

Concerning the use of carbon tetrachloride the following is of great interest:—

"To sum up, then, it may be said that the early experience seems to indicate that carbon tetrachloride is a better drug for the treatment

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of hookworm disease than chenopodium, thymol, or beta-naphthol. In doses of 2 cc. for adults it is extremely efficient in the removal of worms and there is less probability of serious intoxication or even severe symptoms than by routine treatment with chenopodium in 1·5 cc., thymol in 3-gram, or beta-naphthol in 4-gram, doses. The only exception to this rule appears to be found in those cases in which the liver has been weakened by alcohol or other causes.

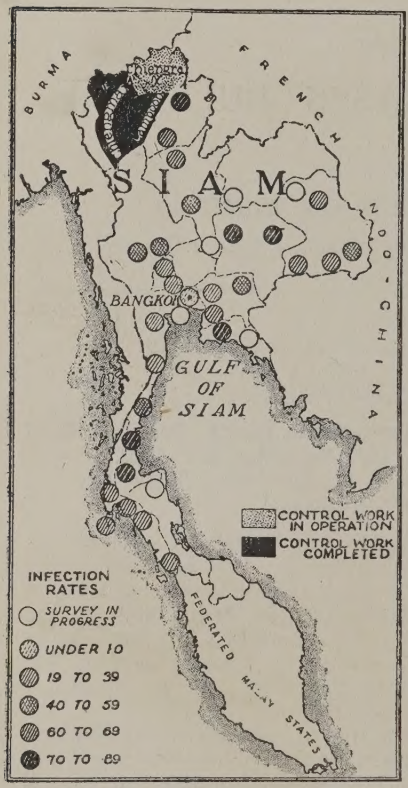

Fig. 28.—Map of Siam showing progress of hookworm survey and control campaign at the close of 1922.

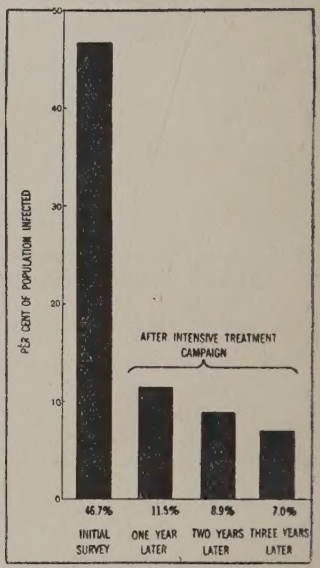

Fig. 29.—Diagram illustrating reduction in hookworm infection rates on four estates in the Vere area, Jamaica, resulting from treatment campaigns.

[Reproduced from the *9th Ann. Rep. International Health Board*, 1922.]

" The drug is palatable, making it less difficult to induce patients to accept treatment than the other remedies. Its definite chemical composition makes it preferable to compound drugs of herbaceous origin. Moreover, apart from the economy it effects through the ease and cheapness of its administration, the drug itself is considerably less expensive than either thymol or chenopodium.

" In Ceylon it was given to a number of children who had previously been treated with oil of chenopodium on one or more occasions, with

the result that it removed all or a large proportion of the worms that had remained after chenopodium treatment. It may also, apparently, be safely given in pregnancy, when other remedies are contraindicated.

Fig. 30.—Minnow hatcheries maintained by county health departments are now a common sight along the highways of many southern states in America. *Top:* in Houston County, Alabama, U.S.A.; *Centre right:* road signs like this appear in many parts of Texas; *Centre left:* hatchery in Florence, Alabama; *Bottom:* top minnow hatchery in Yazoo County, Mississippi.

[Reproduced from the *9th Ann. Rep. International Health Board.*]

In Fiji hundreds of pregnant women have been treated with carbon tetrachloride without a single reported case of abortion, and in Ceylon a number of anaemic and emaciated children who had fever from various causes were treated with excellent results."

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Dept. Public Health Bull. No. 104. 1919. Oct. 179 pp. With 27 figs. [59 refs.]—**Transactions of the First Annual Conference of Sanitary Engineers and Other Officers of the Public Health Service directing Antimalaria Campaign. Held at Wilmington, N.C. Feb. 17-20. 1919.**

An account of the Second Annual Conference was given in the last number (p. 2). The publication consists of a series of papers on the

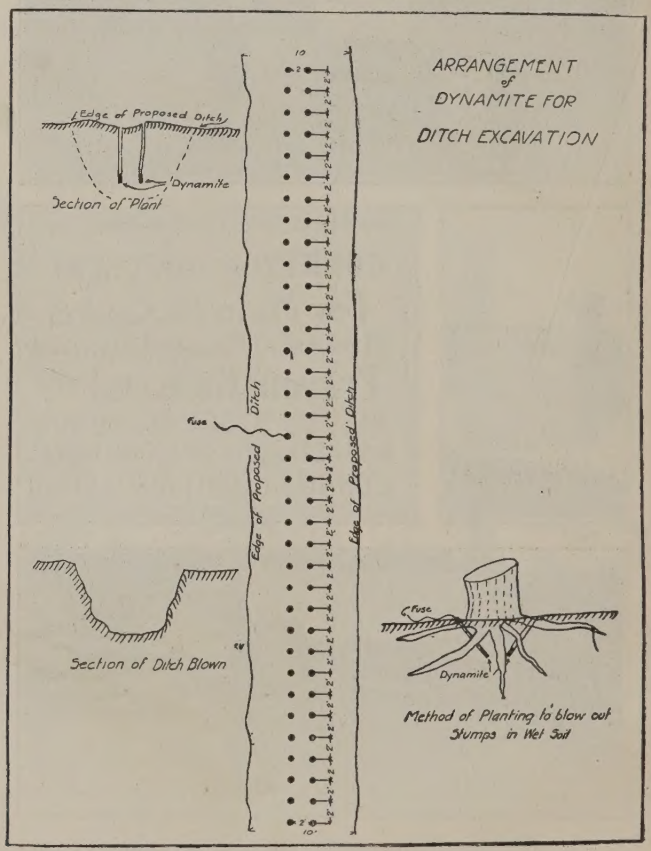

FIG. 31.—Arrangement of dynamite for ditch excavation and for blowing up of tree stumps in wet soil. For ditch excavation straight 40 per cent. or 60 per cent. dynamite is placed in two rows of holes, made with a shovel handle or round stick, about 2 ft. apart and from 3 to 4 ft. deep, in sections up to 150 ft. One stick of dynamite ordinarily is placed in each hole, a detonating cap and fuse being attached to one of the sticks near the middle of the section. In wet soil the concussion from the explosion of this stick usually suffices to set off all the other sticks in the section and a ditch from 6 to 12 ft. wide and 4 to 8 ft. deep, depending on the soil and the skill of the blaster, is formed. After the section blasted has had time to dry out a small gang of men clears the débris and rakes out loose mud, etc. The method does not work satisfactorily in dry ground.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

subject of malaria prevention and the discussions which resulted from them. Owing to its length it is quite impossible to do it justice within the space of a review. Papers on the following subjects were read :—

Screening of residences ; railroad malaria problems ; tide gates : subaqueous saws ; vertical drainage ; flight of anopheles ; rice field control measures ; hibernation ; fish control ; pond control ; oiling ; the use of dynamite in malaria control operations, etc.

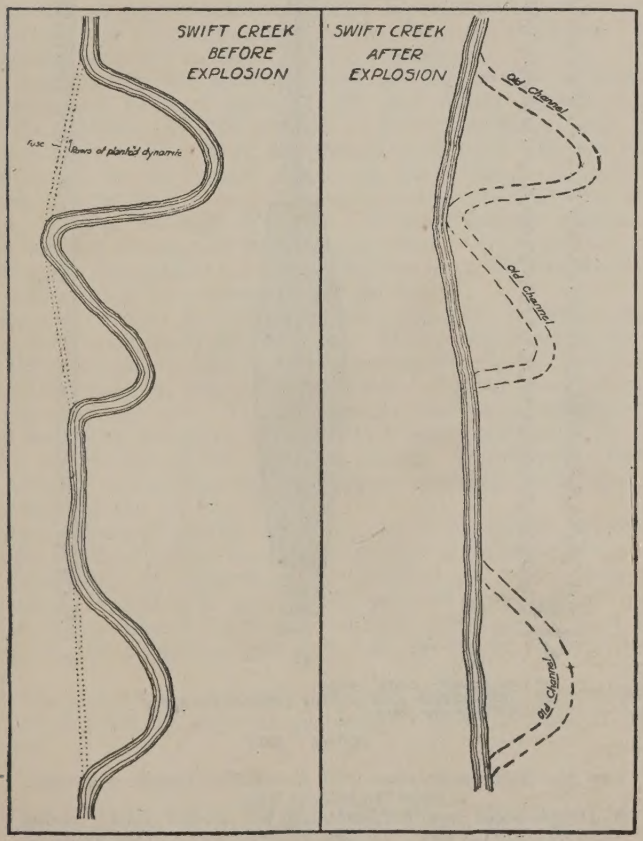

FIG. 32.—Dynamite used to straighten and deepen channel of Swift Creek. The stream, which averaged about 20 ft. wide and from 1 to 6 ft. deep, and had an extremely tortuous course, giving rise to pools and backwaters, was straightened over a length of 4,540 ft. at a cost per linear foot of $0.334.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

All of these are of very great importance and deserving of the attention of all sanitary officers in tropical countries, but the methods applicable to the southern states of America are not always applicable to more primitive countries.

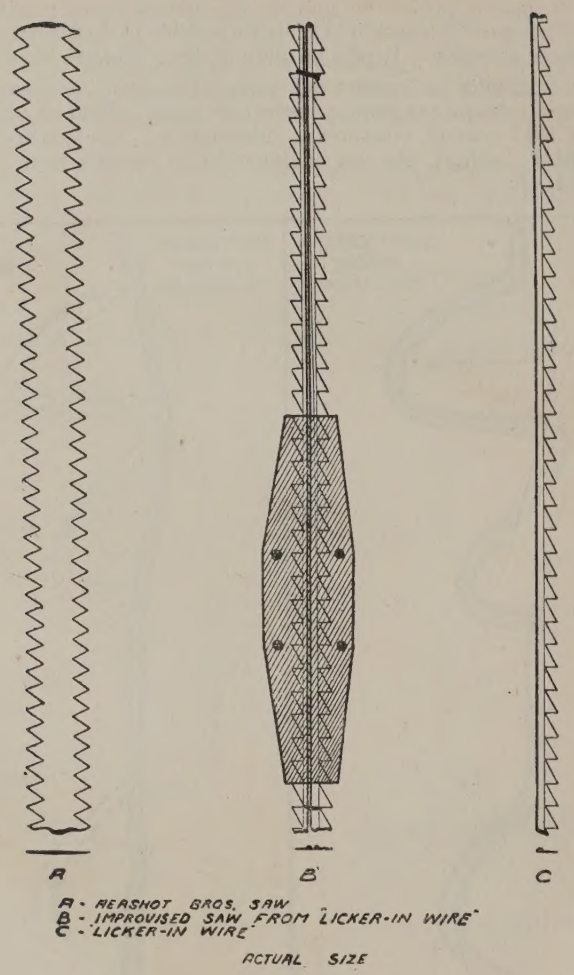

FIG. 33.—Subaqueous saws used for clearing aquatic vegetation from the beds of lakes.

A. Double-edged saw manufactured by Aershot Bros., costing about 30 cents per foot. The saw blade is twisted in the form of a spiral making it more effective in cutting.

B. Improvised subaqueous saw made by tying the hilts of two "licker-in" wires back to back at intervals of 8 or 10 ins. The saw is weighted by cast-iron tubes 4 in. long slipped over it at intervals of 4 ft., to allow it to take the contour of the lake bed. It is used in lengths of 100 ft. and 50 ft., with ropes tied to each end.

C. "Licker-in" wire as used in the combing process at cotton mills. It costs about 30 cents a pound, which averages 2½ cents per ft. The steel is not well tempered, but in long lengths and made into an improvised saw [see B above] provides a substitute for the more costly subaqueous saws on the market.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

We reproduce some interesting figures (Figs. 31, 32 and 33), which is probably the best way of reviewing the work within the space at disposal, and a few extracts.

It is estimated by Assistant Surgeon General H. R. CARTER that 60 per cent. of the malaria of the United States is man made.

Concerning fish control, in many places it has been found necessary to remove larger fish before adding Gambusia. This is best done with a charge of dynamite. Gambusia themselves are sometimes caught by local fishermen as bait; this obviously must be remedied. As a result of experiments in Augusta it was found that fish work satisfactorily in much denser vegetation than was presumed. It is not always necessary to clear out all the weeds.

In Augusta Mr. WAGENHALS found (*a*) fish control a valuable, economic and efficient method; (*b*) that certain factors entered into the efficiency of this method. "For example, a large pond requires a great many more fish than a small pond. Do not expect a half-dozen fish to control a mile of pond edge. If vegetation is present a larger number of minnows will be required than if the edges are ideal for their operation. If game fish are abundant, a larger number of minnows are necessary than if there are but a few of the game fish present; by removing the large fish, the number of top minnows can be correspondingly decreased."

Oiling, control of drainage, etc., were primarily conducted in the water, not in the rice fields themselves. Here it was found by observation that the oiling tended to pool in certain places and killed the rice that was sprayed on, but the use of sawdust reduced the breeding and did not affect the rice. Gambusia being equally distributed over the plots tended to collect in the more open water and leave the parts where the growth of the rice was densest. Intermittent watering was found to be unsatisfactory, as it only removed the larvae to another place and injured the rice crop.

Surgeon General CARTER, criticizing one of the papers, stated that in some rice field control measures the effect of an attempt to control the production of mosquitoes by drainage and oiling had been negligible. Screening is a factor in preventing the spread of the disease, but he placed the greatest reliance on eliminating the malaria carrier in the population (which is usually scanty) in rice-growing areas.

A subaqueous saw is an instrument used for cutting vegetation. It is made of a flexible steel and can be used up to a length of 200 to 400 feet.

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department. Public Health Bulletin No. 125. 1922. Sept. pp. vi+193. With 8 figs.—**Transactions of the Third Annual Conference of Malaria Field Workers. Held at Hot Springs, Arkansas, November 15-17, 1921.**

This bulletin is the third issued by the Conference of Malarial Officers sitting at Hot Springs, Arkansas. The volume extends over close on 200 pages, and, like the former, gives a verbatim account of the discussion of the several papers. This is not only very interesting reading but considerably enhances its value.

The bulletin deals with such subjects as the "use of arsenic as a larvicide for anopheline larvae," by Dr. M. A. BARBER; "The use of

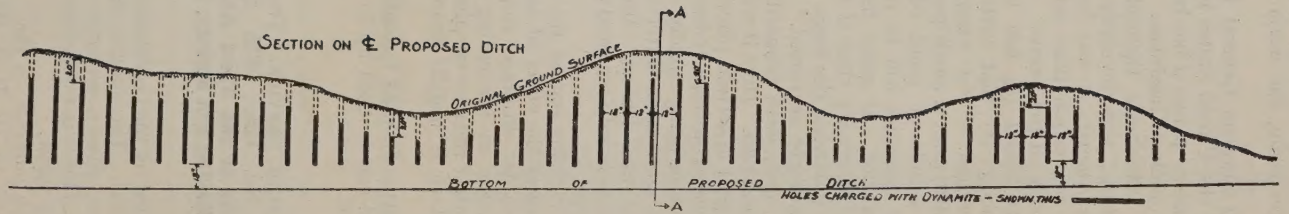

FIG. 34.—Profile showing method of placing dynamite for blasting ditches. Only one line of dynamite was used loaded down to 18 in. of the proposed bottom of the ditch and to within 18 in. of the top of the ground. $1\frac{1}{4}$ in. octagon-shape steel bars were used for making the holes: as each bar was withdrawn the hole was immediately loaded to prevent access of sand, using a tamping stick to pound down the dynamite. Notches on the tamping stick provided a convenient measure for securing uniformity of loading.

[Reproduced from *Public Health Bulletin*, No. 125, U.S. Public Health Service, Washington.]

dynamite and T.N.T. in blasting ditches," by J. L. CLARKE ; "Effect of drainage districts on the control of malaria in the Mississippi delta," L. L. HIDINGER ; "Seasonal incidence of malaria with special reference to transmission," by Dr. C. BASS ; "Economic losses from malaria," by A. W. FUCHS and others.

As regards the first paper we have already referred to the use of trioxymethylene and Paris green for destroying anopheline larvae. The latter is an arsenical compound and is mixed with ordinary road dust and sprinkled by hand over the surface of ponds. 10 cc. mixed with about a quart of fine sand is adequate for 4,000 sq. ft. of water surface. The material costs 22 cents a pound in New York and is packed in 300-lb. barrels. It is found to be extremely deadly to the larvae of mosquitoes and is not added in sufficient quantities. the author says, to render the water poisonous to animals.

A paper by J. L. CLARKE on "Blasting ditches" gives the whole of the technique, including the cost, in that part of the world. The diagram (Fig. 34) gives some idea of the method. We regret that we cannot give more space to this very interesting brochure, but recommend malarial officers to obtain copies for themselves.

FERGUSSON (Harry F.). [**Une campagne contre les moustiques dans l'Illinois (Etats-Unis d'Amérique).**]—*The Engineer.* 1923. May 4. Vol. 135. No. 3514. p. 482. [Summarized in *Bull. Office Internat. d'Hyg. Publique.* 1924. Feb. Vol. 16. No. 2. pp. 231–232. [1 ref.].]

The writer gives an account of the malaria in the town of Carbondale, situated in the County of Jackson, Illinois, considering both the financial loss occasioned by malaria and the measures for its removal. He estimates that 3,000 cases which formerly occurred in the town caused the loss of about £20 per head, so that the estimated economic loss is between £50,000 and £60,000 a year. In the spring of 1922 the Municipal Council organized a campaign against the disease. Assistance was forthcoming from the sanitary engineer from the State. A study of the surrounding country showed that the breeding places were in a zone of about 60 acres of marsh to the north of the town and a lake of 40 acres to the south, some small ponds and a large number of storage cisterns for rainwater. The Central Illinois Railway drained the marsh by a ditch about 2 miles long, dug in the American way by the use of dynamite. This rapidly improved the situation, and the town lake, which was covered on the edge with vegetation, was lowered 18 in. Petrol and oil were used for cleaning the banks. Of 664 rainwater reservoirs nearly 400 were reproducing mosquitoes. These were cleansed and the minnow Gambusia added. The total cost was about £850.

KLIGLER (I. J.) & WEITZMANN (I.). **Malaria Control Demonstrations in Palestine. Report on Malaria Control Demonstrations of the Hadassah Medical Organisation.**—75 pp. With 6 figs., 1 map & 2 charts. 1922. Jerusalem : Printed by the Jerusalem Printing Works Ltd.

The work described in this report has been alluded to in this Supplement under the head of the " Minutes of the Palestine Anti-malarial Committee." (See infra, p. 81.)

" The places selected for the demonstrations were Migdal, Kinneret and neighbouring settlements, Menahemia, Yabniel and later Um-Ul-Alek. The first four places are in Lower Galilee, fairly near to one another, and readily accessible—matters of great importance for administrative purposes. The place last named is in Samaria, and was selected as a type of an isolated Kewuzah with a high malaria incidence. . . .

" The three important points tested were :—

" 1. Degree of malaria reduction obtained by the combination of (*a*) treatment of carriers, (*b*) anti-mosquito measures, and (*c*) quinine prophylaxis. This demonstration was carried on in Migdal and Kinneret.

" 2. The protective effect of (*a*) treatment of carriers, and (*b*) anti-mosquito work (without quinine prophylaxis). This experiment was made in Yabniel.

" 3. The protective value of (*a*) treatment of carriers, and (*b*) prophylactic quinine (without extensive anti-mosquito measures). This was done in Menahemia and Um-Ul-Alek, but since the mosquito problem in both places proved to be small, this experiment has little value in establishing the effect of prophylaxis as a single control measure in a campaign against malaria."

Careful description of the various places is given in the report and much valuable detail of the procedure adopted, particularly in the cost of oiling, etc.

" Only two species of anopheles were observed in this area and their prevalence varied with the season. In April *A. maculipennis* and *A. palestinensis* were found ; throughout the summer months only *A. palestinensis* was observed ; at the end of October the *A. maculipennis* re-appeared. The *A. maculipennis* is evidently a spring and fall species, while the *A. palestinensis* is pre-eminently the summer variety."

In nearly all of the above series the population appears to have been so small that it must be extremely difficult to be sure of the correctness of the conclusions. For instance, in the Migdal control area, exclusive of Migdal, the population is only 350 individuals, 60 living in rooms on a farm, 15 Arabs living in tents just east of the farm, and about 250 labourers working on a road living in tents. The population fluctuated considerably during the investigation, and this must obviously have largely vitiated the conclusions.

The total cost of operations at Migdal, including the cost of cleaning and repairing the canal, is indicated below :—

	£E.
Part of salary of sanitarian	82.60
Petroleum	22.80
Crude Oil	3.50
Incidental Expenses	25.00
Ditching and Cleaning Canals...	20.00
Total cost of Mosquito Control ...	£E.153.90

In discussing the results the writers consider that in all places reduction of about 80 to 90 per cent. of malaria was obtained, and, an interesting conclusion, find that the significance of natural swamps is small compared with the artificial breeding places. First in order of importance are the breeding places arising from man's carelessness and the general neglected condition of the country ; the irrigation

systems are more trouble and much more deadly than the swamps. The remedies for the malaria situation in Palestine are, briefly :—

" (1) The co-operation of the various settlements in the cleaning of their respective long-neglected and consequently overgrown wadis. Once properly cleaned and regulated, these wadis could be kept under control at very little expense.

" (2) The improvement and control of the method of irrigation. The simplest solution for this problem is the method of intermittent irrigation, as carried out in Migdal. The season of malaria epidemics coincides with the period of most active irrigation, and both at Migdal and Kinneret the primitive system of irrigation employed by most farmers gave the greatest amount of trouble.

" (3) The gradual drainage of the swamps resulting from overflowing springs, etc., by the inhabitants in co-operation with other agencies. At comparatively little cost for labour help, the anti-malaria inspector in each of the places under control succeeded during the first year in draining small but important swampy areas.

" (4) The constant supervision of all these places to protect the inhabitants against their own negligence and indifference, and inculcate the habit of proper self-care. Education is as important in malaria control as in other phases of Public Health Work."

The writers consider that the best petrolizing fluid was a crude oil-petroleum mixture which consisted of one part crude oil and four parts petroleum. When 0·1 per cent. of castor oil is added the film has uniform resistance and is approximately twice as large as that given by the crude oil mixture alone. Castor oil added to petroleum gives a film 10 times as large as that of petroleum, but it is not homogeneous and is readily destroyed. It would seem, therefore, that the 1 : 4 mixture of crude oil and 0·1 per cent. of castor oil is the best for all purposes.

PALESTINE. **Proceedings of the Eighth Meeting of the Anti-malarial Advisory Commission, 22nd November, 1923.** [HERON (G. W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

As usual, these minutes are of very great interest. The department had a trying time owing to the necessity for rigid economy in expenditure. Much of the matter discussed at the meeting was naturally of very local importance. The following extracts, however, are of general interest.

" Dr. Kligler read a report on the ' Infectivity of Palestinian Mosquitoes.'

" He said there were eight species of Anopheles in Palestine, six of which were house visitors and consequently potential malaria carriers. There were also epidemiologic indications that some of these species were of greater and others of less significance. It was a matter of practical importance to know the relative significance of the various species of Anopheles as malaria vectors. There were many swamps which bred only *A. elutus* (*maculipennis*), others which bred only *A. superpictus* (*palestinensis*) and still others which bred chiefly *A. sergenti* or *A. multicolor*. If some of these mosquitoes were of greater importance as carriers of malaria parasites than others, the extent and cost of control might be reduced considerably without affecting its efficiency . . . . .

" Experimental infection of mosquitoes had been attempted. Five feeding experiments had thus far been carried out—four with *A. elutus* and one with *A. sergenti*. In each case the mosquitoes received only one feed of infected blood. One feeding experiment with *A. elutus* was on a patient with benign tertian gametes who had received quinine one day prior to the feeding. None of the mosquitoes became infected. The other experiments with *A. elutus* were with malignant tertian gametes. In two instances the patient had received quinine two days and a few hours respectively before the feeding and the results were negative. In the third experiment the patient had not received quinine for three and a half days prior to the feeding and 75 per cent. of the mosquitoes surviving seven days or longer were infected.

" The experiment with *A. sergenti* was also with malignant tertian gametes. The patient had received quinine 36 hours before feeding. The results were negative.

" The results of these feeding experiments indicated (1) that *A. elutus* was a carrier of malignant tertian parasites contrary to the assumption recently made by Buxton. (2) That neither *A. elutus* nor *A. sergenti* were infected by a single feeding on patients who had received quinine within 48 hours prior to the feeding. This applied to benign as well as malignant tertian parasites.

" With regard to infected mosquitoes in nature, the dissections carried out thus far were of interest. Most of them were made during the months of October and November. Up to the present about 175 *A. sergenti* (chiefly from Bet Alfa) have been dissected, and 75 *A. elutus* (from Benjamina). The *A. sergenti* were all free from infection while one of the *A. elutus* had definitely developed cysts.

" *A. elutus* might, therefore, be considered, even after these preliminary experiments, as an important vector of malaria in Palestine.

" Dr. Kligler emphasized that this was only a preliminary report and that the experiments were being continued."

Dr. SHAPIRO'S note on Paris green :—

" In his tests he followed the method of Barber. He used 10 gm. of Paris green for 100 square metres of swampy areas. The Paris green was diluted with fine road dust or with fine sand, if dust was not available, in the proportion of one to 100 and mixed very thoroughly. The method of dusting the mixture varied with the kind of place to be dealt with. In open pools covered with algae, scattering in the direction of the wind was quite sufficient ; but in places where in addition to horizontal there was also low or tall vertical vegetation, better results were obtained when the vegetation was very tall with puddles of water in it. Usually one learnt after a little experience just how far the powder was carried after it was thrown. One could actually see green particles on the surface of the water.

" Paris green did not affect pupae nor ova. 12–14 hours after the use of Paris green he found pupae and first stage larvae alive. Paris green was, therefore, used at intervals of not longer than seven days.

" The cost of Paris green was about Pt.22 per kilo c.i.f. Jaffa. 100 gm. were sufficient for 1,000 square metres and cost 22 milliemes. In using paraffin for the same area 10 litres were needed and cost about Pt.13. Thus Paris green was at least five times as cheap besides being more effective for certain kinds of swamps . . . .

" The use of Paris green had been of distinct help in their work. With regard to the danger of using Paris green they had not noticed

any harmful effect. If the spreading was done to windward and the hands were washed free from any particles there would be no danger to the operator. Barber insisted that because of the small amount of diluted poison spread and because of the fact that only a very small fraction of the compound was water-soluble, the danger of poisoning animals drinking treated water was small.

" The analysis of Paris green at the Government Laboratory, Jerusalem, showed that it contains 2·2 per cent. of arsenic soluble in water. A few samples of treated water taken on the 2nd or 3rd day after Paris green was used were also analysed. The surface water in one sample contained 2·5 parts per million of arsenic and 0·4 and 0·5 of one part per million in two others. One sample of treated water taken from the depth of the pool gave five parts per million while another also taken from depth gave only 0·5 parts per million.

" He had used Paris green in wadies and pools, some of which were frequented by cattle, but he had not met with any indication of trouble. Once he noticed dead tadpoles on the day following the use of Paris green. The surface feeding fish were not affected by Paris green, nor were culicines (which feed below the surface)."

CHRISTOPHERS (S. R.). **Enquiry on Malaria, Blackwater Fever and Anchylostomiasis in Singhbhum. Report No. 1. Preliminary Investigation into the Conditions on the Bengal Iron Company's Mines at Manharpur, January, 1923.**—37 pp. With 6 maps & 4 figs. 1923. Patna: Supt. Govt. Printing, Bihar and Orissa.

This report is one of the most valuable in the domain of malaria investigation that has come to hand. Situated in the somewhat remote part of Singhbhum are three separate mining camps worked by the Bengal Iron Company. The labour employed in these camps has always suffered from malaria to a greater or less extent. Col. Christophers visited them, made a careful investigation of the locality, and collected a mass of very valuable information. The report itself is so condensed that it is extremely difficult to make an intelligent attempt at reviewing it. We recommend that all interested in the subject of malaria investigation and anti-malarial measures should obtain a copy and use it as a model whenever investigations of this nature are in progress. The more important features are given below:—

Malaria Infection in Children—Among the 18 children of age 1–2 resident on the estate for at least 12 months the average parasite value was 12,084, and the infections encountered ranged from 83,000 to 140 parasites.

" Assuming that each child had the same history as regards cycles of parasites as the others we may for the purpose of illustration make the following approximate estimate of what an individual child passes through. As 18 children examined at random at a given time had five infections of over 10,000 parasites per c.m., one child of these 18 is likely in 18 days, on the average, to have five such infections. Similarly for 13 out of the 18 days it ought to have over 1,000 parasites per c.m. and no day without parasites.

" The significance of the above findings is further appreciated when it is considered that, as a result of counts of parasites in attacks among seamen, Ross and Thomson (1910) fixed 200–500 in the case of *P. vivax* and 600–1,500 in the case of *P. falciparum* as the number of parasites per c.m. required to cause fever. From counts given by these authors.

it would seem that from 3,000–4,000 parasites per c.m. were invariably associated with an attack, and a temperature rising to 103°F. or over. Taking even 5,000 parasites per c.m. as a convenient test number for an infection sufficient to cause an attack, each of these children must be considered as under 'attack' conditions in respect to the number of parasites in their blood on 8 out of 18 days at least. Not only so, but the number of parasites would represent attacks of some severity. The highest count in the series is only once exceeded in Ross and Thomson's figures, and out of 30 attacks in the seamen, only 8 are as high as the next four higher in the children. This degree of infection, also, was not during the fever season when one might suspect it to be temporary, but at a time when malaria transmission was probably least active.

"There seems little doubt therefore that *this intense infection, that can only be described as continuous attack, with an average parasite count of over 10,000 parasites per c.m., and lasting something like two years, is an essential feature of hyper-endemic conditions.* I shall call it the stage of *acute infestation.*

"It is extraordinary to consider that a small baby should be able to pass successfully through a two-year-long attack of malignant tertian, which is what such a stage amounts to.

"In children of age 2–5, who have been resident on the estate for at least three years, the proportion infected is still as high as ever, but the average value of the infections is now altogether different, for the average number of parasites is now only 1,200 per c.m., and the highest infection encountered one of 5,420 parasites per c.m. For the sake of illustration we may say that at this stage the child now only has an attack state about once in 25 days.

"Through age period 6–10, among those who have passed through the ordeal of acute infestation, the numerical value of infections was under 1,000 per c.m., though the actual infection rate was still approximately 100 per cent. The period following acute infestation and lasting through childhood to adolescence we may call the stage of *immune infestation.*

"In the case of children (under the age of six) who came into the camps at some subsequent age to birth, the period of acute infestation appears to have been the first two years of residence. Twenty children of age 3–5 of under two years' residence showed an average parasite value of 14,3*3 whilst 25 children of the same age with over two years' residence showed an average of 1,320. We may presume then that immigrant children, if not already immune, commence their period of two years' malarial apprenticeship in the stage of acute infestation at whatever age they enter the area . . . .

"The net result of childhood passed under hyper-endemic conditions is the acquirement of a form of immunity. It is probable that immunisation is produced not by infections and attacks scattered through the age of childhood, as I think has generally been supposed, but by a period of terrific parasitic infestation lasting some two years, followed by a changed state in which parasites are still to be found, but in small numbers. The period of acute infestation should normally start shortly after birth, but in the case of immigrants may commence at a later age.

"Associated with the period of acute infestation is a spleen of moderate size (4–6 cms.). Further increase in the size of the spleen is more associated with the period of low numerical prevalence of

* A figure has apparently dropped out here.

parasites. This period of low numerical parasitic prevalence has a very significant resemblance to the so called 'salting' of animals in trypanosomiasis. It will be of interest to follow the further course of events into adult life . . . . .

"Nothing has been said about the occurrence of sexual forms of the parasite. In all 37 out of the 208 children examined showed crescents. The numerical value of the 37 crescent infections was not high, the highest infection encountered being 392 per c.m. and the average 57 per c.m. Darling gives 12 per c.m. as necessary to infect the mosquito, and as this number would usually be detected in the examinations made, the 37 cases should represent the number of carriers. These, it will be noted, at this time of the year form only about 18 per cent. of the whole.

"The cases in which crescents were found in the children gave an average of 6,154 parasites per c.m. and five of the infections were over 10,000 per c.m. Crescent formation was therefore associated with the large rather than the small infections. Twenty-two of the 37 children in which crescents occurred were under two years' residence, and 13 in children of 3–6. Crescents were therefore more characteristic of the period of acute infestation. Collectively there were 2,095 crescents (taking only cases in which crescents were found) to 227,696 asexual parasites or 1 to 108. But if the whole child community be considered the number of crescents would be 1 to 390 . . . . .

"Malaria Infection in Adults—Taken collectively the percentage infected among adults was 49, and the average parasite value 122. The number of infections over 5,000 per c.m. was nil, and there were only five infections of 1,000 per c.m. or over. Only one infection (4,040) approached what we have previously taken as 'attack' condition, and we may say that at this time of the year an adult, on the average, would seem to have an attack only about once in 158 days (five months). *This peculiar relationship of low value of infection and high percentage infected must represent immunity in the adult.* A European living without any protection, as most of these men do, in the midst of infection would undoubtedly suffer much more severely.

"Considering the history of malarial infection among those living in this hyper-endemic area, from birth to adult life, the following sequence is observable.

Stage.	Age and residence in years.	Spleen rate.	Per cent. infected.	Average parasites.	Frequency of attack.
Acute infection..	1–2	75	100	12,629	Almost continuous
Immune infestation	3–5	88	96	1,320	Once in 25 days
,, ,,	6–12	71	86	1,018	Once a month
,, ,,	12–16	46	50	198	Once a month
,, ,,	Adult	11	50	122	Once in 6 months

. . . . . .

"We may epitomise the conclusions in this section by saying that under conditions which to the newcoming child means intense, almost continuous heavy infection, the adult lives infected, but without suffering illness. It is necessary to remember, however, that the conditions here dealt with refer to the non-fever season. There is some reason to believe that in malaria immunity is relative, *i.e.*, that

the amount of infection displayed is to some extent dependent on the amount of infection to which the 'salted' adult is exposed. With increased dosage of infection the average parasite value of the community may be raised and appreciable attacks become more frequent and the labour force may then appear to their employers to be suffering unduly from fever. The mechanism would appear, however, to be an entirely different one from the occurrence of an epidemic among a non-immune community, and the practical difference will probably lie in the fact that whilst the 'salted' population are perhaps liable in the fever season to occasional attacks of sickness, an unsalted population in the same conditions would be completely incapacitated. There can be no doubt that in weighing up the advisability of action against malaria a reasonable allowance must be made for the fact that a 'salted' labour force is not in the same urgent need of protection that a 'non-immune' one would be."

Recommendations.

"(1) Certain anti-malaria measures are urgently called for; these are:—

"(*a*) Rectification of the conditions in the large excavated area at Manharpur. A proper outfall for drainage of the floor should be provided and the necessary filling in and digging of drains to ensure that pools do not form undertaken.

"(*b*) The wet rice-land near the Manager's bungalow at Manharpur should be acquired and sub-soil drained.

"(*c*) It would be for consideration whether such action as is suggested in regard to the ravine at Manharpur could be carried out, possibly with assistance from Government as it would be to some extent an experimental measure likely to yield information of importance to the province generally.

"(*d*) The herring-bone drains through the seepage area at Chiria would be better converted into sub-soil drains. Some information regarding this type of work as carried out in the Federated Malay States taken from an article by Lieutenant-Colonel Harvey, I.M.S., and the author in the *Indian Journal of Medical Research* (Vol. x, no. 3, p. 759) is attached as an appendix.

"(2) The labour now employed is one acclimatised and relatively immunised to malaria. I do not therefore at this stage recommend any costly anti-malarial work with a view to its protection, beyond that given above.

"(3) Attention should be given to the position of the skilled labour quarters. These would be better re-erected further up the hill slope, as even if the excavation is made innocuous, the present quarters are too close to the ravine and the bed of the Koina. If the enquiry is to be continued, as I recommend it should, it might be well to wait for further information as to the most suitable situation to be adopted.

"(4) Existing European bungalows should be well and suitably screened. Any new bungalows should be erected in selected situations after due enquiry has shown what such situations should be.

"(5) The use of quinine should be encouraged and possibly during the fever season benefit might be obtained from a regular issue to workers, but such action is only advised where a great deal of sickness from fever appears to be about. All should be encouraged to ask for the drug when suffering from fever. A dose of ten grains for an adult or five for a small child should be given at a time and repeated at request. Tabloids are the most convenient form but should be from

a thoroughly reliable firm, and the order should be given for them to be crushed in a little water when taken.

" (6) Europeans should be provided with instructions regarding methods of personal protection and encouraged to improve on such. They should also be instructed regarding treatment of fever.

" (7) The Buda scheme should be carried out if practicable. But it would be desirable to commence with a temporary camp in which the conditions after occupation for some time could be investigated.

" (8) Cases of severe anaemia in the labour are likely to be due to anchylostomiasis and should receive thymol treatment. It is recognised that there are grave difficulties in an attempt to introduce conservancy, but in the case of certain lines it might be tried whether a suitable type of latrine with an incinerator would not be used if it were erected *near the lines*, made of a type that met with the coolies' approval and well tended and supervised.

" (9) Further enquiry is necessary for practical results. Above all, information is required as to the nature of breeding places during the rains and the extent to which anopheles then disseminate themselves from the streams. Further enquiry on anchylostomiasis in the camps should also be undertaken."

MANGOEWINOTO (R. M. M.). **Sanitation of the Tjihea-Plain.**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1923. Pt. 3. pp. 236–274. With 4 figs., 5 charts & 1 map. [2 refs.]

The state of affairs of which the writer gives a very interesting account in many ways resembles what occurred in the Canal Colonies in the Punjab in India.

A valuable piece of country known as Tjihea plain in the Dutch East Indies was only irrigated to the extent of about 300 bahu (about 525 acres). In 1865 an enterprising local Rajah desired to irrigate the whole of the plain from a neighbouring river. A certain amount of work was carried out, but without skilled advice, and as a result of these somewhat primitive methods about 500 bahu were brought into irrigation. The Government took over the matter later on, and at the cost of 5,000,000 guilders and 15 years' toil the irrigation plan was carried out.

The water was first available in 1904; considerable increase of the population resulted, and the first year's crop was naturally a great success. Distribution of water left a great deal to be desired, and the people went on growing crop after crop until the fertility of the soil was greatly reduced. Owing to the careless methods of irrigation malaria became extremely rife. The canals were always full of water, and consequently the edges became overgrown with vegetation, the drying up of the paddy land was never properly carried out, and this brought with it its own result, in that malaria-carrying mosquitoes increased enormously, and the disease became so prevalent that the population declined. A vicious circle resulted, and much paddy land was left fallow or more or less submerged.

Several medical officers visited this part of the country and made investigations into the cause of this state of affairs. The authorities described the area as follows:—

" 'Many fallow, ill kept, inundated sawah's, where the marshy flora is luxuriantly pushing, gardens and fish ponds ill kept, besides there are still several lakes, the whole resembles one large marsh'; this

condition was imputed to the fact that more water was supplied than was carried off."

The writer went to the plain shortly after, in 1918 or 1919. The estimation of the spleen index of 4 subdivisions of the plain showed that in two the index was over 80 per cent., in one it was 64, and in the other 75. The amount of fallow paddy land had gone up considerably, so that in 1917 there was 15,000 bahu unattended. Recommendations had been made for the use of mosquito nets; these had never been treated seriously by the natives, who looked on them as ornaments. The people looked anaemic and the children had large and swollen abdomens. The mortality rate of 1917 is given as 32·4 per cent. This rate appears to have remained stationary after about 1914, but there is no doubt that many sick left the country without being replaced by immigrants. A very careful survey of the spleen index and the parasite index of the district was carried out, and, as is usual, it appeared that at about the age of 15 years the parasite rate showed a very rapid decline. The mosquitoes found in the area were of several different varieties, but *Myzomyia aconita* as the important carrier of malaria and the true house mosquito was largely the cause of the malaria present. This variety was particularly to be found in inundated paddy land and the vegetation which bordered the irrigation canals.

Remedial measures were suggested and commenced by the writer. These consisted of :—

" 1. Laying absolutely dry the planted sawah's, after the rice having been cut, and the fallow sawah's.

" 2. Planting the sawah's simultaneously.

" 3. Cleaning the ditches, which contain water.

" 4. Quininization of the population, as acute recrudescences of the epidemic appear."

The author has not a very great opinion of quininization in an oriental population, on account of the difficulty of making it thorough, but the measures Nos. 1, 2 and 3 were of vital importance to the whole of the district. Further investigations at a subsequent date showed that the recommendations were producing a satisfactory amelioration of the conditions in the population.

As is pointed out, " the watchword will remain : keep your ditches clean; lay dry your sawahs immediately after the rice has been cut."

The writer also investigated such interesting points as the flight of the *A. aconita* and also the usefulness or otherwise of placing buffalo stables in close proximity to human habitations. He does not believe that under the conditions present on the Tjihea this measure is of much use.

HEYDON (G. M.). **Malaria at Rabaul.**—*Health.* Melbourne. 1923. Nov. Vol. 1. No. 9. pp. 249–254. With 4 figs.

This small town is situated in the island of New Britain, 4½ degrees south of the Equator. It has a population of about 350 whites with 1,000 Asiatics and 1,500 natives. Malaria here appears to be carried by *Anopheles punctulatus*, which breeds in natural waters such as pools, ditches, swamps, but not in tanks, roof gutters, cut bamboos, empty tins, etc., nor in the water in the leaf axils of the banana plant. Its numbers are not great in the town, but there is no doubt from dissection that this is the carrier. Out of 136 specimens caught in

native quarters 6·4 per cent. contained sporozoites and 6·2 oocysts. Preventive measures followed the usual lines, such as drainage, oiling, etc.

LEGER (M.) & BÉDIER (E.). **Résultats d'un essai de prophylaxie quinique du paludisme dans les écoles de Dakar.**—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 101–102. [1 ref.]

The writer gives an interesting account of an attempt to reduce the number of parasite bearers in school children in Dakar. A dose of ·25 gms. of quinine hydrochloride was given to each child 3 days a week between the months of October 1922 and July 1923, this being the most malarious season. Before treatment, out of 210 children examined, the parasitic index was :—

	Dakar.	Medina.
In children under 10 years of age ...	43·7	63·6
In children over 10 years of age ...	30	59·6

At the conclusion of this treatment the following diminution in the parasite rate was obtained (103 children). It appears to be decidedly encouraging :—

	Dakar.	Medina.
Children under 10 years of age ...	23	22·7
Children over 10 years of age ...	22·2	21

OBERLÉ & VIALATTE (Ch.). **Paludisme et lutte antipaludique dans les troupes d'occupation du Maroc.**—*Arch. Méd. et Pharm. Milit.* 1923. Nov. Vol. 79. No. 5. pp. 700–728. With 2 charts & 1 map. [15 refs.]

The writers give a very interesting, if somewhat lengthy, account of all aspects of the malarial problem in Morocco. All types of malaria parasites were found ; the mosquitoes responsible are *A. maculipennis* (Meigen 1818), *A. hispaniola* (Theobald 1903), *Pyretophorus myzomyifacies* (Theobald 1907), *A. algeriensis* (Theobald 1903). *A. maculipennis* appears to be by far the most wide-spread species. The geographical distribution of the disease in the Colony is given in full detail.

Blackwater fever appears to be rare—in fact it has been denied that it exists in the country. This, however, is not correct, as at any rate one death occurred, in 1921, in a child of European parentage at the age of 8 from this disease ; two cases were reported in 1922.

Prophylaxis follows the usual lines.

The writers find prophylactic quinine of very great utility, particularly if properly taken under supervision.

CLOUARD. **Note au sujet de l'état sanitaire des contingents indigènes du corps d'armée colonial pendant l'année 1922.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. Sept.-Oct.-Nov.-Dec. Vol. 23. No. 3. pp. 323–338. With 5 charts.

The writer gives an interesting account of malaria in Madagascar. He is not hopeful concerning anti-larval measures. The main difficulty is undoubtedly the close proximity between paddy land and habitations. He considers that quinine therapy is more likely to give good results if it can be pushed. The main cause of failure

of quinine is that children at the breast cannot be given quinine and they frequently act as a reservoir of parasites, and adults who are not great sufferers from fever are often careless about the taking of the drug regularly.

MACKENZIE (M. D.). **Fighting Malaria. II. In Russia.**—*World's Health.* Paris. 1924. Jan. Vol. 5. No. 1. pp. 12–15. With 3 figs.

The writer gives an interesting popular account of the outbreak of malaria in Russia which followed the revolution and the famine. He says that bringing wood dripping with snow into the house increased the number of mosquitoes there, and suggests that the wet wood acts as an excellent breeding ground for the mosquitoes. This would seem to be doubtful. The main difficulty in dealing with the epidemic was the great lack of quinine.

LEAGUE OF NATIONS. **Monthly Epidemiological Report of the Health Section of the Secretariat.** No. 64. pp. 337–378. With 1 fig. and 13 charts. 1924. Mar. 15. Geneva.

Malaria in the Ukraine. 1923.—"Statistics of notification of malaria in the Ukraine, which have just been received, show that during the first ten months of 1923 a total of 446,873 cases were reported. An annual rate of 2,156 per 100,000 population is thus indicated . . . .

"The reported incidence during the period January–October 1923 in the several governments is shown in the accompanying tables and diagram. An extraordinary range in rates of incidence is shown, from 79 per 100,000 in Podolia to 8,059 in Donetz, and it is evident that the highest incidence has occurred in the south-eastern and the lowest in the north-western governments. This fact is significant in view of the great prevalence of the disease in the regions east of the Ukraine."

HURWOOD (Alan S.). **Some Observations on the Use of Oil as a Larvicide.**—*Health.* Melbourne. 1923. Nov. Vol. 1. No. 9. pp. 255–259. With 2 charts.

The writer has done a considerable amount of work on what may be termed the physics of oiling a water as an anti-malaria measure.

" 'A film exists wherever a layer which has a different composition from the body of the liquid is present at the boundary surface, provided the area and form of this layer are independent of the gravitational forces acting. Wherever the area and the form of the layer depend upon both the surface and gravitational forces, a lens exists.'

"From a consideration of the Neumann triangle of forces, a method of specifying the conditions of spreading can be derived. This assumes the surface tension of the under liquid to be pulling in one direction and the surface tension of the upper liquid, together with that of the interface, to be pulling in the other direction. Motion of the edge of the drop takes place in the direction of the greater pull.

"Spreading occurs if the adhesion between the two liquids is greater than the cohesion in the liquid which is in the position for spreading, while spreading does not occur if the cohesion is greater than the adhesion."

A large number of various mixtures of oil were tested in the laboratory.

"Oils investigated—

(*a*) Liquid fuel oil, No. 1. (*d*) Phinotas oil.
(*b*) ,, ,, ,, No. 2. (*e*) Sumatra fly oil.
(*c*) Power kerosene. (*f*) Prince's larvicide.

. . . . . .

"The Phinotas oil and Sumatra fly oil are phenolic tar oil-soap emulsions.

"(*a*) Phinotas oil contains 0·6 per cent. tar acids.

"(*b*) Sumatra fly oil contains 6·3 per cent. tar acids.

"Prince's Larvicide is a phenolic tar oil-soap emulsion containing some unemulsified tar oil, and 15 per cent. tar acids."

From the results of experiments on the above it became apparent that the addition of 10 per cent. of heavy oil to kerosene increased its filming percentage and by its heavy nature decreased the volatility of the film.

"The results may be summarized briefly as follows :—

"1. A mixture of 70 parts of kerosene and 30 parts of residual (fuel) oil constitutes the most efficient admixture of these oils for spraying mosquito larvae. Such a mixture is easily worked, and has no clogging effect on the spray. Also it costs less per unit volume than does kerosene, and produces a more durable film than does the latter.

"2. The use of a higher proportion of residual (fuel) oil, up to 50 per cent., is well worth a trial under field conditions. Laboratory experiments indicate that in sheltered localities such an admixture would prove an efficient larvicide.

"3. In the open country, spraying with these oils would have to be carried out at least once a week in quantities of approximately 1 oz. to the square yard. In sheltered pools half this rate of spraying should be sufficient.

"4. Phenolic Tar Oil-Soap emulsions and preparations of the Prince's Larvicide type are very effective in killing mosquito larvae. Containing, however, scheduled poisons, they cannot be used generally, but in restricted areas, no doubt, should prove very efficient.

"5. The addition of a small percentage of vegetable oil to kerosene improves its filming value and also increases the durability of the film. Thus in the spraying of tanks, such admixtures might in the long run prove more economical for use than kerosene.

"It should be noted that these tests were carried out under laboratory and not under field conditions. While to a certain extent these conditions are parallel, there are factors such as wind, rain, and direct sunlight, evidenced in the field and not in the laboratory which have a marked disturbing influence on oil films. These factors have not been considered in the foregoing tests, and practical experience only can show the optimum conditions for oil spraying."

White (R. O.). **Yellow Fever in the Gold Coast : Its Endemic and Epidemic Character.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 431–437. [5 refs.]

The writer discusses the endemic and epidemic character of yellow fever. He points out that several of the usually accepted theories of the spread of this disease are rather doubtful. The Gold Coast has

been an endemic centre for many years; on the other hand, it is not infrequent that 5 or even 10 years pass with so small number of cases that it is doubtful how the disease is kept alive. Among a million cases treated in Nigeria in 1920 and '21 there was only one diagnosis of yellow fever.

Europeans get the disease and die from the malady much more rapidly than natives. The idea that Europeans get a mild attack and survive is incorrect, as in recent epidemics 100 per cent. have died. It seems probable that the commerce between the mosquito and the native eradicates the disease not by the process of conferring general immunity but by the death of the virus.

The indigenous native dissociated from the presence of newcomers is incapable of maintaining the virus, but it would appear that the proximity of Europeans and a plentiful supply of stegomyia heighten the virulence of the organisms so that outbreaks not infrequently occur. The writer concludes his paper with the following remarks :—

" It is well known that any break in the chain of essentials which go to produce a yellow fever infection is sufficient to stop, or at least interrupt, the process. The lapse of time which takes place between observed epidemics in West Africa seems to suggest that the chain is delicate in its construction and that the process of building up the virus sufficiently to produce recognisable effects is a long one. Segregation of Europeans—in as far as it obtains in West Africa—appears to have the effect of lengthening the process. It has certainly provided immunity for the segregated, for in no single instance has a case occurred among them. When it is remembered that in segregation areas native servants—often Kroo-boys and natives of the Northern Territories—live in close contact with the European, it would seem that the slightest precautions are sufficient to prevent infection. As Carter suggests in his statement of requirements for the maintenance of a yellow fever infection, the number of mosquitoes may fall short of what is necessary. It probably will be found also, that non-interference with the mosquitoes, overcrowding and lack of light and ventilation are necessary. Routine sanitary work probably interferes from time to time with one or other of these subsidiary requirements, and has the effect of delaying the development of the virus. But sooner or later, it would seem, an area escapes over a period which permits it to become intensely infective, and an outbreak of yellow fever results.

" The localised character of these outbreaks in a town is due to the well-marked domestic habits of the mosquito concerned. If we look at the spot maps accompanying the Reports of the 1910–11 epidemic, it is easy to see the human agency which carries the disease from one part of a town to another, over distances which leave intermediate areas unattacked.

" It is, therefore, the infected rather than the infective element which is responsible for the spread of the disease. If we can control the former and keep it from coming into close living contact with the unsegregated European, there is a reasonable prospect of preventing re-occurrences of these outbreaks. Efforts at controlling the other element have hitherto met with very little appreciable success. That temporary success is obtainable has been amply demonstrated during the present epidemic. Towns where the Stegomyia index is normally 80 per cent. have, after a week's intensive work, had this figure reduced to below 5 per cent. The means employed, other than fumigation of

the area in which cases occurred, were the usual mosquito brigades under the supervision of European volunteers.

" The effectiveness of this measure, when considered in the light of what has already been said, suggests the advisability of instituting a 'cleaning-up week' at least once a year, in every town where cases of yellow fever have been known to occur within the last twenty years. It should also be a matter of routine that when a case of yellow fever is reported in a Colony, every town with which the infected area is connected by road, rail, or sea, should immediately start energetic anti-stegomyia measures. This will prevent outbreaks elsewhere, for the reason that the number of mosquitoes remaining will not be able to maintain the disease. At any rate, the possibility of a secondary focus being established will be a very remote one. In the intervals between epidemics, Government Medical Officers and other Medical Practitioners should be asked to observe carefully cases of fever which occur in West Africans who are strangers in the place, with a view to early diagnosis, thus ensuring prevention of the development and spread of the disease."

Gouzien (P.). **La fièvre récurrente en Afrique Occidentale Française.**— *Bull. Office Internat. d'Hyg. Publique.* 1923. June. Vol. 15. No. 6. pp. 797–806. With 1 map in text.

The writer gives a very interesting account of an outbreak of relapsing fever (mixed with typhus) which occurred in many of the French colonies on the West Coast of Africa, particularly in Senegal, parts of the French Soudan, and French Guinea. He discusses the origin of the infection and is strongly of opinion that it was not due to the return of native troops who were doing service in the near East during the war, but that it originally came via the Soudan from the north.

At the end of May, 1921, the first case was recognised in the Hospital at Bamako. The infection descended the Niger and appeared further down in September. The first wave of the epidemic seemed to be at its height from December 1921 to February 1922. At that date the disease was within 10 miles of the chief town in the Colony of Haute-Volta, and at the end of the year new centres became infected. The number of deaths increased very rapidly and its virulence appeared to increase with its progress. Typhus fever was also present at this time, and the mortality in the people not treated reached 25 to 30 per cent., the total number of deaths being probably as many as 100,000. It is known that in certain villages 27 per cent. of the population disappeared. This following on the epidemic of influenza of 1918 and 1919 was a very severe blow to the Colony.

The writer discusses the various means of combating a disease of this nature. Neosalvarsan could not be supplied in anything like sufficient quantities.

The writer's opinion is that the greatest benefit is likely to arise from the education of the people, exclusion from school of children with lice in their hair and clothing, and general propaganda on these lines.

Hehir (Patrick). **Typhus Fever in Greek Refugees.**— *Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 347–358. [2 refs.]

The writer gives an account of a severe outbreak of typhus fever which occurred amongst Greek refugees from Asia Minor.

He was serving as the medical administrator to the Red Cross Society in that country and had ample opportunity of studying the disease on the spot.

The article deals with every aspect of the subject, including epidemiology, symptoms, treatment, etiology, pathology and prevention of the disease. The disease was brought from Asia Minor in January of 1923; the city of Athens, Salonica, Patras and Corfu were invaded. The refugees in many cases had nothing but the clothes in which they stood up; obviously, therefore, preventive measures were extremely difficult; the weather was also cold, and there was great overcrowding of the very inadequte shelters that were provided.

As regards preventive measures, the sheet anchor was steam sterilization of the clothing of the individuals, bathing, cutting of hair in all cases of infection and in most of the contacts, the girls' hair being bobbed. Clothes were disinfected in the best apparatus that was available; in some cases Serbian barrel sterilizers, but the writer points out that these are no good in dealing with large numbers, the proper steam sterilizers being then essential. Contacts and people likely to suffer from the disease were given a small bag of NCI powder (napthalene 96, creosote 2 parts, iodoform 2 parts); these were worn round their necks for a week, after which a fresh one was supplied. As the men were ordered to seek work it was obvious that the segregation of contacts was impossible; everything was done, however, to render their clothing and body free from lice. The writer also points out the importance of the nursing staff wearing a one-piece clothing in order to protect them from louse infestation.

PURDY (J. S.). **The Rat and Flea Problem in the Prevention of Plague.** —*Jl. Roy. San. Inst.* 1924. Apr. Vol. 44. No. 11. pp. 438–450.

The writer gives a careful survey of many facts connected with rats and fleas which are well known to the majority of officers in the Tropics. As regards the trapping of rats he gives some rather valuable hints. It is, of course, well known that traps should not be handled by human beings or otherwise the rats become shy of them. He is an advocate of the break-back trap; but points out that any trap that goes off with a bang is fatal to prolonged success. The method recommended is to leave the door of the trap open and allow the rats to feed on the bait without disturbance for a few days until they get accustomed to the trap, then to set the door on the spring mechanism; by this means it is frequently possible to catch a large number of rats at once. He employed many different kinds of baits, such as fish heads, cheese, smoked fish, pine nuts, etc. In a chicken yard small chickens or ducklings are remarkably attractive.

To take away the smell of human beings burning newspaper under the trap is satisfactory.

He does not consider that Rodier's method is practicable, and points out that people object to loosing of the captured males.

On the subject of poisons there is not much new. The use of cultures of microbes has never proved effective in Sydney, and this experience is confirmed in most parts of the tropics.

The writer concludes his paper with the following remarks:—

That after a visit to Batavia in 1920 he was so impressed with the probability of the re-introduction of plague into Australia that he

published the following recommendations to be carried out in the port towns.

"1. That the measures taken to make produce premises rat-proof proved to have been the best insurance we could make against plague.

"2. That the cyaniding of any infected premises was the most effective means of killing both rats and fleas.

"3. That the shutting off of water supplies for rats by the covering of w.c. cisterns was an effective means of clearing premises of rats.

"4. That the only safe method of disposing of garbage in an urban area is by incineration.

"5. That the dividing of the business portion of the City into Blocks and the formation of Block Associations among the business people in each of the 28 blocks, and the combination of representatives into a United Block Association by enlisting the co-operation of the citizens, who worked with the Lord Mayor and the health officials, was a novel and effective organisation which ensured a general clean up campaign and engendered a good co-operative civic spirit.

"6. That public health propaganda by organised Health Weeks, by special exhibits in shop windows, popular lectures, articles in the press, exhortations from the pulpit, special lessons in school, cinema films and posters, all combined to arouse and maintain public interest, and secured the co-operation of the public in encouraging and assisting the work of the central and local health authorities.

"7. That whilst it is impossible to exterminate the rat, it is possible to build him out, and to keep down his numbers by constant trapping and poisoning.

"8. That it is advisable to keep premises, especially public halls, cinemas, theatres, railway and tram carriages, clear of fleas by spraying with a good pullicide such as kerosene emulsion, to which may be added Sassafras, Eucalyptus, Citronella, Aniseed, or other essential oil as a deodorant."

LETHEM (William A.). **The Epidemiology of Bubonic Plague in Great Britain, with Special Reference to its Spread by "Pulex Irritans."**—*Jl. State Med.* 1923. Nov. Vol. 31. No. 11. pp. 508–515. [11 refs.]

This is an interesting paper which deals with plague in England and cold countries generally. The writer is firmly convinced, in fact he actually states that it is proved, that *Pulex irritans* is largely responsible for the spread of plague in England, when once a centre of infection has been established by the ordinary rat flea.

"In the ten or twelve recorded outbreaks in Britain in recent years the details are all very similar. The first case is usually connected with a rag store, a grain warehouse, or with docks. The other cases occur in rapid succession in the house in which the first case is nursed. Most, sometimes all, of the members of the household are infected, and then, with dramatic suddenness, the outbreak stops. If there are similar outbreaks in neighbouring houses one can usually trace a definite connection between the two, either by the visits of friends or by the receipt of clothing . . . .

"The common [rat] flea of cold climates is the '*Ceratophylus fasciatus*.' It does not appear to be quite such a successful plague carrier as

'*X. cheopis*,' or such a ready biter of man. It is common in Britain, but the important point is that it does not live for choice on the rat itself, but in the nest, often underground. Thirty or forty may be found in a nest, while the average on the coat of the rat is only one flea to two rats.

"This number is important when the size of an epidemic is considered. During an epidemic, if each patient were infected by a rat flea, one would expect to find at least twice the number of plague rats as of human cases in an infected house. In this country such a number has only once been found.

"The preference of '*C. fasciatus*' for the nest and not for the rat may explain why in this country the first case of an epidemic is so often connected with a rag-store, where nests are often found.

"This flea is known to carry infection for 47 days, considerably longer than '*X. cheopis*,' and like most others can live in suitable surroundings without a feed of blood for at least three months. It would, therefore, appear that man can be infected with plague up to 47 days after the flea has left its host, the rat . . . .

"Man rarely comes in contact with this flea."

The writer considers that *Pulex irritans* has been ruled out as a source of danger on too little evidence. It dies off at temperatures above 85°F. and is uncommon in India. In the outbreaks that have occurred in this country plague infected rats are either found not at all, or they are extremely rare.

"Here are a few examples. In 1914, in a large seaport town, 13 men were working in a factory amongst grain, some of it imported from the East. One man, and one only, fell sick, and was nursed in his overcrowded and flea-infested house in another part of the town. He died of bubonic plague. His wife, seven children, and one of their playmates contracted the disease in a rapid succession. Altogether ten cases occurred, mostly with a high degree of septicaemia. A thorough search was made by a staff of rat catchers at the house, the factory, and at the ships from which the grain had come. Altogether during that year 25,000 rats were caught; 9,000 were bacteriogically examined and none were found to be plague-infected. . . . .

"An outbreak in another port town started with a dock labourer, who died. A number of Irish sympathisers attended his wake, and of the 36 persons who subsequently developed the disease, most had been at this function. Now an Irish wake is not the sort of entertainment that a brown rat and its fleas would care to attend, but the '*Pulex irritans*' would, and does, in large numbers. No plague rats were found at the time, though a few were found the following year."

Although the writer adduces a great deal of evidence in favour of his thesis we do not consider that it can be accepted as proved. It is obvious that if by any chance it could be demonstrated that plague in England could be rapidly passed from one human being to another, because of pneumonic infection being common in fatal cases, we have an equally satisfactory explanation of the epidemics that have occurred in this country.

It has been thoroughly established that ordinary bubonic plague is not communicated from man to man under conditions that exist in India, but there is a certain amount of evidence, such as in the Manchurian outbreak, that this does not apply to colder countries. Possibly this factor may be at work in England as well.

Reynaud (G.). **La peste considérée dans quelques-uns de ses foyers actuels ; sa diffusion et sa prophylaxie.**—*Rev. Prat. Malad. des Pays Chauds.* 1923. October. Year 2. Vol. 3. No. 2. pp. 93–140. [30 refs.]

The writer gives a long and very full account of the subject of plague, its method of spread and prevention. A large number of authorities from all parts of the world are quoted. In a subject such as this there is naturally very little which is new and which we have not already described. Quoting Heckenroth, he remarks that pneumonic plague is not very infectious in warm countries, but then goes on to distinguish primary and secondary pneumonic plague and qualifies this original statement by the remark that those cases which develop secondary pneumonia are not highly infectious, whilst the primary ones are not only very infectious but prospect of recovery is very small.

Williams (Louis L.), Sullivan (E. C.) & Allen (A. F.). **Rodent Infestation and Rat-Proofing Conditions in Massachusetts Seacoast Cities, New York City, and Baltimore.**—*U.S. Public Health Service. Treasury Dept. Public Health Bull. No.* 121. 1922. May. 41 pp. With 1 map. [14 refs.]

The writer discusses rat proofing of harbours and buildings in New York City, Baltimore and other large towns. The following are summaries of the papers, with recommendations, etc.

Massachusetts.—

" Judging from the survey made to date, it would seem that the water fronts of the various Massachusetts ports offer unusually good rat harbourage with abundant food. It is estimated that a good index of the presence or absence of infection among the rodent population could be determined after the examination of about 150,000 rats. Rat surveys carried on as suggested above would yield approximately this number.

" It is recommended that each health department of the various seaports should be advised to carry on in perpetuity a continuous but moderate rat catch. This should yield a catch of about 50,000 rats a year, which would in all probability reveal the presence of infection at an early date after its introduction.

" In addition to a continuous rat catch, each of the seaports should adopt proper ordinances for the fending off of all vessels and the proper placement of rat guards, an ordinance for the proper disposal of garbage, and an ordinance for the ratproofing of new and reconstructed buildings. Model ordinances along these lines are appended. Each town should adopt such ordinances, in toto or in part, in so far as may be necessary to make the total legislation for each port contain at least the minimum requirements of these three ordinances."

New York.—

" 1. In the replacement of the older docks rat-proof construction should be considered a factor of great importance. Minor defects, which will tend to neutralize the effect of the major expenditure of money, should be carefully avoided.

" 2. Perhaps 15 per cent. of the docks about New York, the majority of which are in the Borough of Manhattan, may be called ' rat proof.'

" 3. In view of the ideal conditions about the garbage docks for rodent breeding and harbourage, it is of great importance that the earliest steps in a rodent-eradication or rat-proofing campaign should include measures to improve conditions about these structures.

" 4. Unnecessary wood planked areas should be removed. Slightly elevated wood platforms are dangerous from a plague standpoint.

" 5. Minor improvements about docks such as repairs to broken double walls and floors, elimination of unnecessary dark spaces beneath and behind small structures on the docks, changes of sheathing so as not to form double walled spaces, removal of rubbish, etc., should be one of the first measures instituted in a rat-combative campaign.

" 6. It should be strongly brought to the attention of those concerned with the docks how unsatisfactory it is to install upon docks wooden platforms and similar structures of such design and location that they tend to make ideal breeding places for rodents. Simplicity of design is a factor which tends to make a rat-proof structure."

Baltimore.—

" Baltimore has a numerous rodent population of mixed species, with apparently a predominance of the ground rat along its irregular shore line.

" The economic damage done by these rats, while of unknown extent, is in the total very great.

" There is a potential health danger in the presence of these rats as possible transmitters of bubonic plague, and while this danger is at present unknown, there are means whereby it may be determined and the following recommendations provide these means :—

" 1. There should be established in the health department a squad of rat trappers, about eight in number, under a competent, trained foreman, who shall systematically trap given areas of the city, primarily along the water front and dumps. This squad should be considered primarily for the purpose of securing rats for examination for the presence of plague and not for the purpose of eliminating rats from any given building or area.

" 2. The efforts of all other agencies concerned with the destruction or collection of rodents should be co-ordinated with this force so that all such rodents may be secured for this examination and so that their source of origin may be known.

" 3. A suitably equipped laboratory should be provided in the health department, in charge of a laboratory chief, with a laboratory assistant and a clerk.

" 4. Means should be provided in the health department for the transportation to the laboratory of all collected and trapped rodents.

" Such laboratory and trapping forces should be considered a nucleus for further expansion as the need, either economic or health, is shown for them and funds may be available. In the presence of an epidemic of plague a force of some 20 or 30 laboratory workers and from 300 to 400 trappers would probably be required.

" As a means of controlling the propagation of rats and of limiting their depredations, the following recommendations regarding the rat proofing of a community are made :

" 5. Strict enforcement of the provisions, as noted in the body of this report, of the present or proposed building codes should be made.

. . . .

"8. There should be enacted legislation covering the methods and enforcement of rat proofing of such properties as are not now covered by laws, namely:

"(*a*) Food-handling establishments and stables to be rat proofed by strict compliance with the provisions of the building code, covering: Cement floors, side walls of the building extending into the ground at least 3 feet.

"(*b*) Small outhouses which may be rat proofed by lifting them off the ground, admitting light under them.

"(*c*) The elimination in all food-handling establishments and stables of all double walls, ceilings beneath upper-storey floors, and so-called unnecessary spaces; or if these cannot be eliminated, then the flashing of all angles between floors and walls with metal."

There are also three separate enactments: (1) An ordinance compelling the placing of rat guards; (2) an ordinance regulating the removal of rubbish and garbage; (3) an ordinance defining rat proofing of all buildings. These are very useful but are too long to quote *in extenso* here, and those interested in legislation on this point should obtain copies of the Bulletin.

Taylor (J.) & Chitre (G. D.). **Note on an Electrical Rat-Guard for Ships' Hawsers.**— *Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 643–652. With 2 figs.

The writers give the results of their experience of rat guards for ships' cables and describe a new device for protecting ports from infected ships' rats which works on an entirely new principle. They point out that the ordinary metal rat guards are not infrequently rendered unsatisfactory by clefts in the metal which act as footholds for the rats; if the guard does not fit sufficiently tight on to the cable it is useless; the rivets in the plates act as footholds for the rats, and slacking of cables brings the edge of the guard and the rope together.

Experiments have been carried out with an entirely new guard which makes use of electric current to electrocute the rats as they tread on it.

"A general idea of the guard will be best obtained from the drawing [Fig. 35]. It consists of a triangular box two-and-a-half feet long and of internal dimensions such as will enable it to accommodate and grasp firmly the rope on which it is placed. Two of the sides are rigidly fixed at a permanent angle of 60 degrees. The third side is hinged and the loose edge of this side when the guard is fastened around the rope closes the triangle. A hook at each end is used to fix the guard in position. The angles are filled in by suitably shaped pieces of wood attached to the inside of each end so as to leave no space for the passage of rats. These have been omitted from the drawing for the sake of clearness.

"The guard is 'wired' on all three sides in the pattern shown.

"The 'wiring' is done by means of strips of No. 20 gauge aluminium sheeting. These are $\frac{1}{4}$-in. wide and placed at $\frac{1}{4}$-in. intervals. The sheeting is a standard article of trade and is inexpensive and is obtainable in the bazaar and in towns such as Bombay. It possesses the advantage of being a good conductor and is not liable to corrosion. The aluminium sheeting is cut into strips on a guillotine such as is used in tin-plate works, as it is difficult to cut absolutely straight strips of

¼-in. width by means of shears. The strips are arranged in an interdigitating pattern, alternate strips being attached to a transverse strip at one end or other of the guard. The attachment of the strips to the wooden guard and to the transverse strips is done by means of copper tacks. The transverse strips run completely round the guard

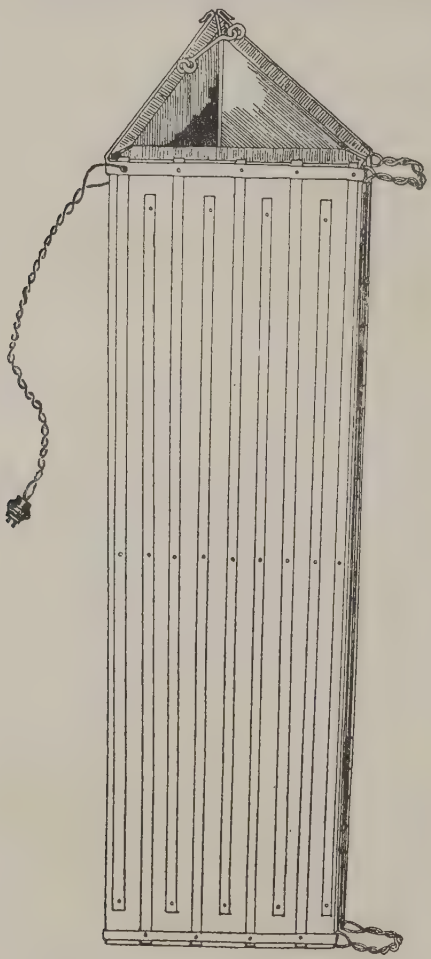

Fig. 35.—Showing details of electrical rat-guard for ships' hawsers.

[Reproduced from the *Indian Journal of Medical Research.*]

except at the hinged angle where continuity is obtained by making a flexible copper wire connection. A wall plug and a suitable length of 'workshop flex,' 'cab-tyre' or other convenient lead completes the apparatus, the two wires of the connection being joined up to the last two aluminium strips."

The current found most satisfactory was 220 volts alternating current. A direct current of 110 volts (the one usually provided on

ships) is not sufficiently strong to stop the rats on all occasions, though under experimental conditions it was found to give a very large degree of protection. Another advantage of this apparatus is that it can be made very strong and is very much more lasting than the ordinary flange guard on cables.

MATHIS (C.). **La lutte contre la peste à Phnom-Penh (Cambodge).**—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 668–674.

The writer gives an interesting account of plague measures at Phnom-Pénh, in Cambodia. These do not differ materially from those in other parts of the world.

DORISY (C. E.). **Epidemic of Typhoid Fever and Other Intestinal Diseases in Everett, Wash., July, 1923.**—*Public Health Rep.* 1924. Mar. 28. Vol. 39. No. 13. pp. 605–611.

An epidemic of enteric fever occurred at Everett, Washington, a town of approximately 30,000 inhabitants, obtaining its water supply from the Sultan River, a mountain stream, the water of which flows through a long wooden pipe line.

On July 12th a large number of cases of ordinary diarrhoea were noted in the town. These increased in number till July 20th. The epidemic appeared to be confined to certain parts of the town, but it quickly spread.

Samples of the water taken throughout the area showed very considerable fluctuation in the bacteriological purity at different points. Thus, a sample taken at Pine Street gave coli present in a tenth of a cc., total colony count at 37°C., 8,000, at 20°C. more than 10,000. A sample taken in another part, namely, Maple Street, showed only about one-tenth this number of bacteria. It should be stated that there were two water supplies in the town, a chlorinated supply for drinking purposes and another system of pipes connected with the drinking water main which could be opened and shut in order to improve the pressure and quantity of water available in case of fire. A connection between the treated and untreated water was actually taken into use sometime shortly previous to July (the work being sanctioned in March). Investigation showed that a large quantity of unsterilized water had been allowed to pass into the drinking water supply of the city for a period of 14 days prior to the outbreak. The first case of enteric was reported on July 25th ; 77 cases occurred in all. At least 2,000 cases of diarrhoea and dysentery were also reported. Nine deaths were caused from enteric and 2 from dysentery.

Subsequently regulations were made prohibiting the use of cross connexions.

VASQUEZ-COLET (Ana). **The Viability of Intestinal Pathogenic Bacteria in Fruits and Philippine Foods eaten Raw.**—*Philippine Jl. Sci.* 1924. Jan. Vol. 24. No. 1. pp. 35–39. [1 ref.]

The writer investigated the viability of cholera, dysentery and typhoid organisms in certain native articles of food commonly exposed for sale in the market in Manila.

"Experiments with the cholera vibrio show that it survives from four hours to one day, at least, in bagong [which consists of fresh shrimps pickled with salt] ; one hour in patis ; in vinegar, at the end of one hour no cholera vibrio could be isolated. In native cheese (queso) the cholera vibrio will survive at least two hours. On the cut surface of mangoes, bananas, chicos, and lanzones the cholera vibrio survives at least one day ; on the cut surface of guavas it survives at least five hours ; on the cut surface of apples it seems to thrive well ; at the end of six days the infected apples were still positive for cholera vibrio. On the outside of bananas the vibrio remains viable for at least two days ; on the outside of lanzones, one day ; and on the outside of apples, four days.

"Similar experiments were performed with *Bacillus typhosus.* From bagong, contaminated with *B. typhosus,* the bacillus could not be isolated at the end of five minutes ; in patis, it can survive at least one day ; in vinegar, five minutes. In native cheese it is still visible at the end of two days. On the cut surface of mangoes, bananas and guavas it survives at least one day ; on that of chicos two days ; on the cut surface of lanzones, seven hours ; on the cut surface of apples it remains viable for at least three days. On the outside of apples and lanzones, it survives seven hours ; on that of bananas six hours."

Winckel (Ch. W. F.). **The Framboesia-Problem in the Dutch East Indies.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1923. Pt. 3. pp. 213–226. With 6 plates. [12 refs.]

The writer gives a valuable account of the anti-framboesia campaign which has recently been carried out in the Dutch East Indies. He describes the disease as a real scourge, tormenting millions of people in Java. It is a disease of the low-lying country, its frequency decreasing as one gets on to the higher plateaus. However, on the Batak plateau in Sumatra (which is more than 3,000 ft. above the sea level) there is a considerable amount of yaws.

" Some physicians in the Dutch East Indies estimate the number of framboesia-patients in their district at 12 per cent. of the population, in other districts the rate is estimated at 90 per cent. An examination of 643 school-children in Acheen showed 348 (55 per cent.) of them to be affected with the disease."

The authorities in Java rapidly came to the conclusion that two things were essential for success, namely, a satisfactory and rapid remedy and a strenuous propaganda amongst the natives.

As regards the former, Ehrlich's salvarsan gave excellent results ; neosalvarsan is practically a specific for the disease. As long ago as 1914 extensive use had been made of this drug and the natives were beginning to appreciate its efficacy ; the war, however, rendered the purchase of sufficient quantities almost impossible. It was not until 1919 that a beginning of the treatment on systematic lines could be made.

As regards the latter, namely propaganda, the first step was to arrange demonstrations of the efficacy of the drug. A number of patients were treated before an assembly of civil servants, representatives of the natives, native doctors, village chiefs, priests, etc., who were asked to meet again on a certain date, when the treated patients

were inspected by them. The Government doctor then addressed the assembly and emphasized the following four points in his address :—

" 1. Framboesia has grown a true scourge of the population, since so many people are affected who are disfigured, and sometimes cannot walk, cannot work, etc.

" 2. The disease can be healed by applying salvarsan, as may be witnessed by the patients present.

" 3. Therefore the Government intends to bring this medicine within easy reach of the population, provided the population will give its co-operation by paying for this expensive medicine. The poor will be treated free of charge, but on the other hand the well-to-do will have to pay a little more.

" 4. Accordingly those present are invited to commend the treatment solely in the interest of the population, and in their neighbourhood to urge the patients to report themselves for treatment."

A very extensive poster campaign was initiated ; some of the pictures are published in the hopes that they may be of use in other parts of the tropics similarly afflicted. (Figs. 36, 37 and 38.)

The campaign became extremely popular, and there is reasonable hope of in time almost entirely eradicating the disease. Some interesting administrative details, however, should not be passed over.

One is that the people of Java now pay for their dose of neosalvarsan, and dating from this the number of applications has gone up steadily and is in some districts nearly 10 times what it was when the distribution was free. The actual expense of the campaign to the Dutch East Indies Government is now trivial. In certain sugar factories and plantations the owners have paid for treatment of their labour. When the treatment became popular it was soon shown that the hospital establishments could not cope with the demand ; consequently itinerant medical treatment was given in the villages (Fig. 39). For these dispensaries the following rules were made :—

" 1. Only those are injected who really need a neosalvarsan-treatment.

" 2. The neosalvarsan must be of reliable origin ; it has to be of a quality to all appearance above every doubt.

" 3. The dose for a native adult is 0·450 gram at the utmost, corresponding to 0·600 gram for the average European ; children get smaller doses according to their age.

" 4. The patients having been injected are not allowed to go home straightway, but should wait at least half an hour.

" 5. For treating eventual collapses, excitantia should be at hand (camphor, digalen, caffein, etc.).

" 6. The injection has to be made lege artis. . . . .

" The neosalvarsan used by the Dutch Indian Government is supplied at a reasonable price by the " Höchster Farbwerke," according to a special agreement ; it is forwarded directly from the factory, in a special packing, and in this way the average cost of a dose of 150 milligram is a little less than 20 cents (freight, packing and duties included). Fifty tubes in an erect position being packed together in one box, one may ascertain at a glance, whether in some tubes the medicine has already assumed the notorious orange-red or brick-red colour. . . . .

" By putting a sufficient auxiliary staff at the disposal of the doctors, charged with the injections, and by amply providing them with Record syringes and with reliable needles, the number of injections performed

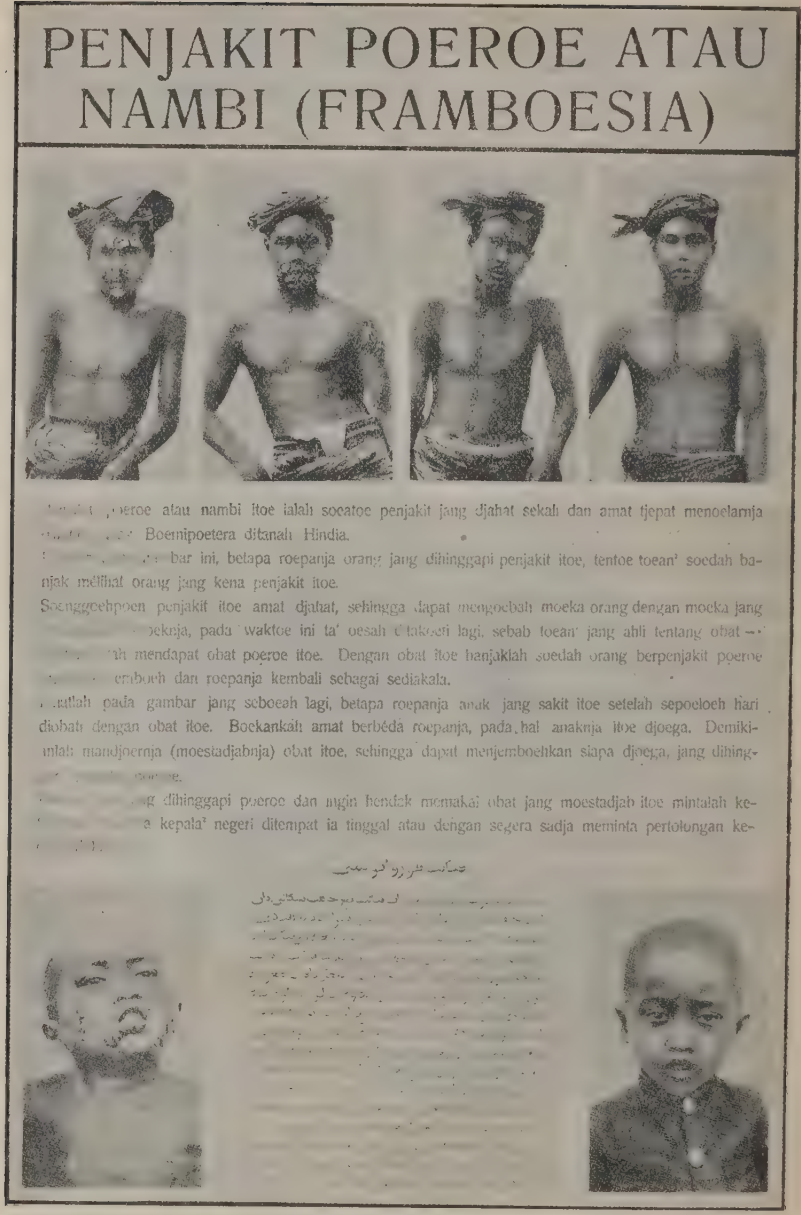
PENJAKIT POEROE ATAU
NAMBI (FRAMBOESIA)
oeroe atau nambi itoe ialah soeatoe penjakit jang djahat sekali dan amat tjepat menoelarnja
Boemipoetera ditanah Hindia.
bar ini, betapa roepanja orang jang dihinggapi penjakit itoe, tentoe toean' soedah ba-
njak melihat orang jang kena penjakit itoe.
Soenggoehpoen penjakit itoe amat djahat, sehingga dapat mengoebah moeka orang dengan mocka jang
bekrja, pada waktoe ini ta' oesah ditakoeti lagi, sebab toean' jang ahli tentang obat
ih mendapat obat poeroe itoe. Dengan obat itoe banjaklah soedah orang berpenjakit poeroe
eriboeh dan roepanja kembali sebagai sediakala.
katlah pada gambar jang seboeah lagi, betapa roepanja anak jang sakit itoe setelah sepoeloeh hari
diobati dengan obat itoe. Boekankah amat berbéda roepanja, pada hal anaknja itoe djoega. Demiki-
anlah mandjoernja (moestadjabnja) obat itoe, sehingga dapat menjemboehkan siapa djoega, jang dihing-
g dihinggapi poeroe dan ingin hendak memakai obat jang moestadjab itoe mintalah ke-
a kepala' negeri ditempat ia tinggal atau dengan segera sadja meminta pertolongan ke-

FIG. 36.—One of the Yaws posters issued and distributed by the Medical Propaganda Department of the Dutch-Indies Civil Medical Service.

[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1923. Part 3.]

FIG. 37.—Showing effect of one injection of neosalvarsan on yaws patients.
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1923. Part 3.]

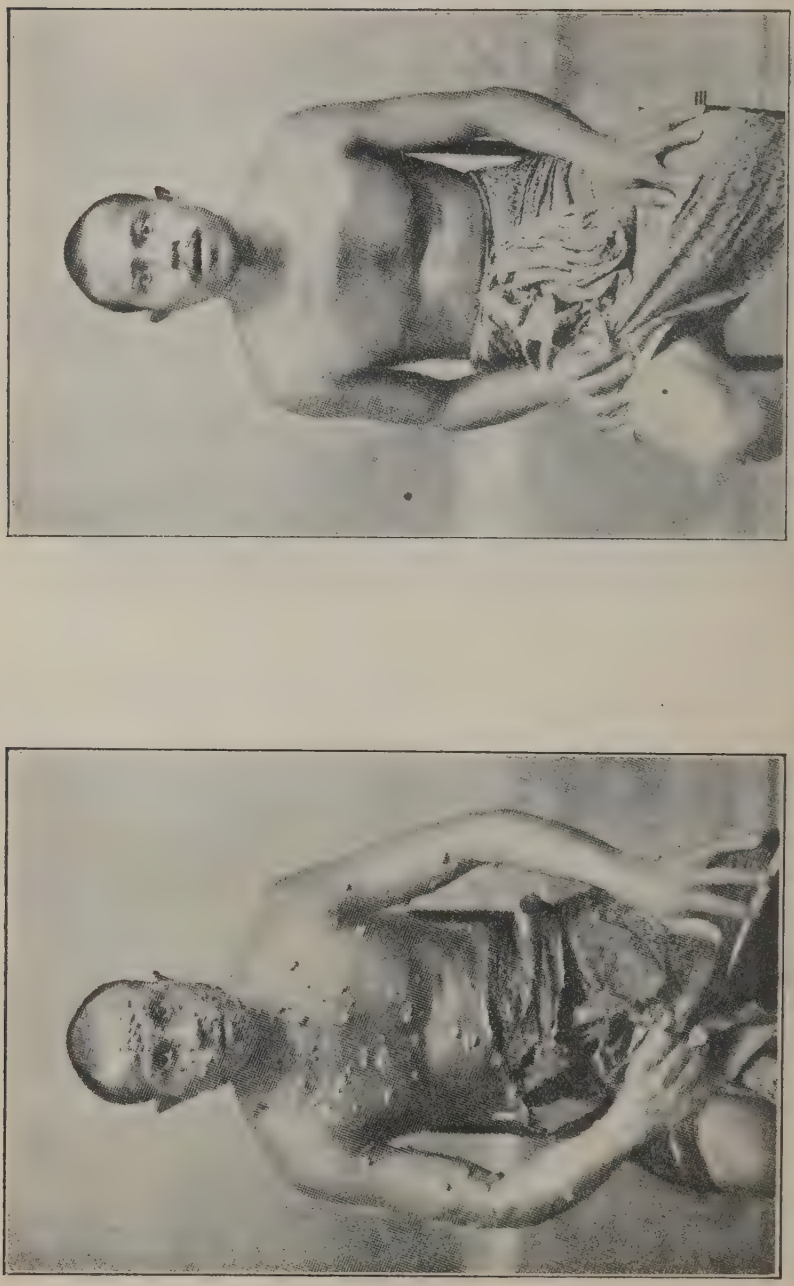

FIG. 38.—Showing effect of one injection of neosalvarsan on a yaws patient.
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1923. Part 3.]

FIG. 39.—Showing medical staff, assisted by the auxiliary staff, treating yaws patients in the Dutch East Indies.
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1923. Part 3.]

daily may be enormously increased. In this case the doctor's task is limited to putting the indication, to fixing the dose and to making the injection proper."

As an instance of the appreciation by the people of this campaign the writer gives several native songs which have been written in praise of its authors. Altogether, since the commencement of the campaign up to the end of the first half year of 1923 nearly 1,000,000 people have received the remedy.

UGANDA PROTECTORATE. **Annual Report on Venereal Diseases Measures for the Year ended 31st December, 1922.** [WEBB (W. L.), Ag. Specialist Officer, Venereal Diseases.]—26 pp. With 1 map & 2 charts. 1923. Entebbe: Govt. Printer.

"The population served by Mulago, living in an area whose radius is not more than five or six miles from Mulago, is roughly 100,000. During the time Mulago has been open 6,057 cases of venereal disease have been registered and treated, or 6 per cent. of the population concerned. In the first year 2·6 per cent. of the population were registered. In the second year 3·4 per cent. This includes men and women. The difficulty of inducing women to attend for the treatment of venereal disease is well known and recognised in England. It is more marked here, where the women are relatively to the men less educated and less intelligent than in Europe. Admitting the greater difficulty in dealing with the women, which will be referred to later in this report, let us deal with the men only. The male population may be taken at half the total population, 50,000. 3,775 cases of venereal disease in men have been registered at Mulago since its inception, or 7·5 per cent. of the male population. 1,722, or 3·5 per cent., were registered in 1921, and 2,053, or 4·0 per cent., were registered in 1922. In the Annual Report of 1921, Major Keane expresses the opinion that 10 to 20 per cent. of the population are suffering from acute contagious venereal disease. Taking the average of his estimate, 15 per cent., it is clear that half of the total number infected have been treated since Mulago started, and that over a quarter have registered in 1922. This can only be regarded as a most satisfactory result to be attained in the present early stage of the anti-venereal campaign. I would again emphasize that no conclusions at all are justified from these figures. But the indication is obvious that the anti-venereal campaign is an established factor in the life of the natives who come within its influence, is increasing in popularity and effectiveness and shows every sign of continuing to do so in a greater and greater degree. . . . .

"The Policy of Attraction.—From its inception, it has become increasingly evident at Mulago that a venereal campaign amongst the natives of Uganda relying on force for its attendances could not be successfully conducted. The Venereal Rules under the Dangerous Diseases Ordinance, the Township (Venereal) Rules and the Native Law, give us ample powers to examine any suspected person and to treat any infected person. And it was mainly on the powers given under these laws that the original attendances at Mulago were obtained. As the work of the campaign became known amongst the natives and increasingly appreciated by them, so the power of the law became less and less a factor in the campaign, until to-day practically the whole of our attendances are voluntary. . . . .

" In place of force, we rely to-day on a general policy of attraction. Sympathetic treatment, efficient treatment, and an understanding of the wants and needs of the native results in greater and more satisfactory attendances than could be obtained through compulsion alone. Good hospital administration, cheerful and pleasant wards, good and varied food well cooked, comfort and cleanliness and a desire on the part of the staff to help, and to alleviate pain or worry, all these attract the native to the hospital, and form an appeal to which he is not failing to respond in a way which he would never do to methods of compulsion."

CARLE. **Quelques considérations sur la prophylaxie anti-vénérienne au Maroc.**—*Maroc-Médical.* 1923. Jan. 15. No. 13. pp. 15–17.

The writer of this letter is a well known authority on social reform and matters concerning the anti-venereal campaign in Lyons who visited Morocco and inspected the work done by the medical authorities in that colony. He points out that the essence of all success in measures of this nature is to give complete control to the medical authorities and take it away from the police.

ALLAIN & AUGAGNEUR. **La lutte antivénérienne à Madagascar pendant l'année 1922.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. May-June-July-Aug. Vol. 21 [22 *sic*]. No. 2. pp. 173–174.

The following figures give some idea as to the amount of work done in combating venereal disease in Madagascar. In 1922 17 new dispensaries were taken into use and more than 30,000 cases were treated, 22,644 tertiary syphilis and 3,281 congenital syphilis. Arsenical injections, 11,476 ; biniodide injections, 31,854 ; cyanide of mercury injections, 816.

During 1923 it was proposed to open 21 new dispensaries and the estimated number of doses of novarsenobenzol to be used was 60,000.

CHINA MEDICAL JOURNAL (Supplement). 1924. Jan. Vol. 38. No. 1. 29 pp.—**Report on the Control and Treatment of Venereal Disease in Shanghai.**

The writer gives a long and interesting account of the history of venereal disease control in Shanghai, which dates back as far as 1869. It may, however, be pointed out that the Public Health Department up to 1923 had no power of regulation or control. After a very careful discussion of the whole subject in 1923 certain definite conclusions were arrived at and a summary of the more important of the recommendations is given below.

" 1. That in the interest of the Public Health the best public policy in Shanghai is not to foster any official system of supervision of prostitutes.

" 2. That prostitution and venereal diseases should be deemed matters of official concern only in the interests of the Public Health, and in the preservation of orderliness and decency.

" 3. That the Municipal Council organise a Venereal Diseases Department under the Commissioner of Public Health. . . . .

" 6. That the Council should organise additional clinics for the treatment of venereal disease among the poor where necessary. . . . .

" 8. That action against any notorious source of infection should be the concern of the Commissioner of Public Health. . . . .

" 15. That the Commissioner of Public Health should investigate and report on the facilities for proper lodging accommodation in Institutes for foreign and native seamen in Shanghai. . . . .

" 17. That washerwomen and needlewomen should not be allowed to visit ships unless provided with special permits from the Missions to Seamen or other authorisation.

" 18. That public advertisement of quack cures and remedies should be prohibited, and attempted treatment by unqualified persons should be a punishable offence."

PIERRAT. **La lutte contre la syphilis sur le territoire de Kouang-Tchéou-Wan.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. May–June–July–Aug. Vol. 21. [22 *sic*]. No. 2. pp. 170–172.

The writer gives his experience of the intravenous injections of the arsenical preparation known as 914. They have been very useful amongst the troops and have become extremely popular with the natives in the Province. 146 persons received 542 injections with satisfactory results coupled with treatment by ordinary mercurial preparations.

FEDERATED MALAY STATES. [**Measures for Control of Beriberi.**]—Extract from letter dated 25 Oct. 1923 [Ref. No. 5 in 119/1923] from the Director of Government Laboratories F.M.S. [STANTON (A. T.)] to the Principal Medical Officer F.M.S. [Received from the Colonial Office Feb. 26, 1924.]

" In the Federated Malay States the following measures have been taken to restrict the use of overmilled rice :—

" *Education and Propaganda*—(a) Pamphlets in English and Chinese and advertisements in Chinese newspapers have been published pointing out the dangers of white (overmilled rice) and the advantages of early hospital treatment for beri-beri ; (b) Undermilled rice is being produced in the Government rice mill for use in hospital and public institutions ; (c) Government is encouraging the production for local consumption of undermilled rice in small estate mills.

" The fall in the incidence of beri-beri in the Federated Malay States during the past ten years has been so notable that it is thought that simple measures will suffice within a few years to abolish the disease. Even now the recorded incidence of the disease is believed to be in excess of its real incidence. Because of its ill-defined clinical character, ' beri-beri ' is a convenient diagnosis for any condition of which weakness of the legs is a feature. Within the past year I have seen cases diagnosed as beri-beri which turned out to be such widely different conditions as ' traumatic myelitis ' and ' septicaemic plague.' ' Beri-beri ' is also a popular post-mortem diagnosis by Inspectors of Deaths who ' view ' bodies before burial."

MARTINEZ BRICEÑO (Rafael). **Lo que ha sido la campaña contra la anemia tropical en Colombia. Datos preliminares.** [Anti-hookworm Campaign in Colombia.]—*Repert. Med. y Cirug.* Bogota. 1923. Oct. Vol. 15. No. 1. (No. 169.) pp. 34–45. With 3 figs.

This hookworm campaign was undertaken under the auspices of the Rockefeller Foundation in co-operation with the local Government, the former providing the personnel. Work was started on June 1st, 1920,

and in the succeeding two and a half years 122,253 persons had been treated, of whom 71,068 are reported as cured, *i.e.*, negative results were obtained on microscopical examination of faeces; many others [the number is not stated] were "practically cured," over 90 per cent. of the worms having been expelled.*

PHELPS (J. R.). **Eradication of Vermin on Board Ship.**—*U.S. Nav. Med. Bull.* 1924. Feb. Vol. 20. No. 2. pp. 247–268. [3 refs.]

The writer gives an account of the various methods of eradicating vermin on board ship, particularly rats, mice, bed-bugs and cockroaches. As regards rats and mice there does not appear to be anything new.

As regards cockroaches the writer recommends spraying the cracks and corners of the ship with a mixture of cresol and kerosene; this kills the cockroaches very rapidly. Dusting the cracks and inaccessible places with sodium fluoride he finds also very successful. Arsenic mixed with food is not of much use, as the cockroaches soon learn that it is a poison and refuse it.

WATER.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 25. Vol. 65. No. 1671. pp. 65-86. **Municipal Engineering in 1923.**

Water Supply [p. 78].—*A new method of purification.*—"Dr. Gilbert J. Fowler's paper on bio-chemical factors in modern methods of water purification, read before the Mysore Engineers' Association Conference at Bangalore, deals with problems presented by lakes, reservoirs, springs, and wells, and the means by which bacteria can be destroyed. This can be effected in two ways, either by the direct action of antiseptics or by the destruction through oxidation of the food supply of the bacteria, which, in Dr. Fowler's opinion, is the safest method where it is practicable. The purification of river water as generally practised, involves the elimination of suspended matter by plain sedimentation or by sedimentation plus coagulation. Dr. Buswell, of America, has shown that the satisfactory use of a coagulant is a more difficult matter than has sometimes been supposed. Dr. Fowler is in favour of storage in reservoirs in spite of the fact that he has pointed out various possibilities of trouble and difficulties in connection with such treatment. Before constructing storage reservoirs, a careful bio-chemical survey of the river should be made for at least a year, in order to determine the amount of storage to be provided for safety and the best times in which to abstract the river water or to let it pass. What is, however, more important is that Dr. Fowler has shown the possibility of a new method of water purification, which may be much cheaper and much more efficient than any process at present in use. In consequence of experiments made in the Yangtzse River, certain facts were established which may have a most important bearing upon work in the future. Great stretches of country through which the Yangtzse flows are level

* Summarized by Dr. H. Harold SCOTT.

plains heavily manured with sewage, yet the water of the Yangtzse and its tributaries does not show any great sign of pollution, except for the presence of nitrates, which are the products of oxidation of the sewage. Mere aëration, although it is capable of removing many impurities, will not oxidise organic matter, and it is no more possible to purify water containing organic matter by simple aëration than it is to purify sewage by the same method. In the case of sewage it is necessary to provide some material which will form a nidus for the bacteria. In the case of the Yangtzse this nidus is provided by a large amount of micacious silt, which is suspended in the water. Each particle of silt forms a nidus for the purifying bacteria, and thus the water is purified in exactly the same manner as sewage is purified in an activated sludge tank."

Surveyor & Municipal & County Engineer. 1924. Mar. 21 Vol. 65. No. 1679. p. 295.—**Water Treatment at Toronto.**

"'The Chlorination of Water Prior to Filtration' was the title of a paper presented at the American Waterworks Association Convention in 1922 by Mr. Norman J. Howard, bacteriologist in charge, Filtration Laboratories, Toronto. This paper was reviewed in "The Surveyor" at the time. Mr. Howard described the treatment of the Toronto water with chlorine, both before and after filtration. Experiments at that time showed that if the raw water were treated with chlorine before filtration better results were obtained (and a considerable saving of expense was effected) than when it was treated with alum. We then stated that from information given in the paper it was difficult to understand the process fully in all details. This paper has now been further explained and illustrated by an article by Mr. Howard, of which an abstract is given elsewhere. It appears that the water at Toronto is sometimes polluted, but very little suspended matter being present this pollution can be dealt with by chlorination. Formerly the same water was treated with a large dose of alum, followed by filtration. It was found that pre-chlorination with a much reduced quantity of alum gave better results. The cause seems to be fairly evident. There are other times, however, when following storm periods high turbidity occurs. It seemed reasonable to rely upon settlement and coagulation in case of such turbidity, seeing that the problem consisted chiefly in the removal of turbidity and not so much in the removal of bacterial pollution, consequently large doses of alum were used. The discovery has now been made that chlorine treatment not only produces bacterial purification but that it also gives good results for the treatment of turbid water. This has resulted in a great saving of expense, the alum dose being reduced from 2·5 grains of alum to ·5 grains. Turbidities up to 100 parts per million were dealt with by 5 grains per gallon of alumina plus ·2 to ·4 parts per million of chlorine. It is suggested that chlorine may assist clarification when used in conjunction with alum by altering the balance between the electrolytes present.

"Mr. Howard again emphasises the fact that with this change of treatment a larger quantity of water can be passed through the filters, which are of the drifting sand type, and that the filtered water has greater bacterial purity. Careful observation has proved that certain tastes present in the water attributed to the use of chlorine invariably occurred when chlorine was not being applied, and the author therefore holds the opinion that there is no relationship between the taste conditions and chlorine; he, however, considers that the taste is due to the

formation of substitution compounds by the action of chlorine on some prevailing conditions in the raw water. It is rather difficult to appreciate the distinction; a similar problem has been faced successfully in connection with the London water, and it should not produce an insuperable difficulty at Toronto. It is to be noted that the filtered water receives a small application of chlorine before distribution. Further investigation of the value of chlorine for the treatment of water before filtration is certainly desirable, for if, as Mr. Howard suggests, the chlorine produces clarification when used in conjunction with alum the case is certainly established for such pre-treatment."

FULLER (George W.). **Development of Water Purification.**—*Surveyor & Municipal & County Engineer.* 1924. Apr. 4. Vol. 65. No. 1681. pp. 337–338.

"In looking over a copy of the Journal of the American Medical Association reviewing 1922 typhoid fever statistics it is noted that, in 57 principal cities of the United States, with an aggregate population in 1920 of 26,000,000, the typhoid death rate per 100,000 was lowered from 19·2 in 1910 to 3·2 in 1922. There were nearly 3,300 fewer typhoid deaths in 1922 in these cities than in 1910, in spite of an increase in population of approximately 22 per cent. Similar statistics by the Department of Commerce covering the entire registration area show a reduction in the typhoid death-rate from 35·9 in 1900 to 7.5 per 100,000 in 1922."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Feb. 22. Vol. 65. No. 1675. p. 207.—**Water Supplies from Polluted Sources.**

"Last autumn there was a serious outbreak of typhoid in Chicago; 198 cases were recorded and there were 16 deaths. The cause of the epidemic is believed to have been pollution of the drinking water with sewage, but the proofs are more inferential than positive. After making very careful investigation, it appeared that the outbreak was not due to milk, oysters, ice-cream, restaurants or swimming-pools. The explosive nature of the epidemic, preceded as it was by an epidemic of intestinal disturbances, is taken as pointing to a typical water-borne mass infection outbreak. The authorities concerned have taken enormous trouble to investigate the whole matter, and they have concluded that the typhoid must have been water carried. It is believed that polluted water, discharged from the Calumet River into Lake Michigan at a point 3½ miles distant from the water intake, was drawn in. Very strong comments are made in *Engineering News-Record*, and reports are published from the Department of Health, the Bureau of Engineering, the Sanitary District of Chicago, and the State Board of Health. Chlorine is normally applied to this water in small doses, and the opinion is held that if no chlorine had been applied the outbreak would have been of a much more serious nature. The epidemic was comparatively mild in character, one person in 3,000 being attacked. A very small dose of chlorine, however, appears to have been given—namely, .3 parts per million—which we are told was sufficient to kill all but the stronger typhoid bacilli, and that these attacked the least resistant of the water consumers.

"It is important to note that the investigators are of opinion that if more chlorine had been used the epidemic would not have occurred. It does not appear that proper diffusion of the chlorine in the water took place. Colonel A. A. Sprague, Commissioner of Public Works, states that the method of chlorine dosage was wrong; the doses were varied so that the remedy was put into effect after the damage was done, and he is strongly of opinion that the chlorine should be used as a preventive, not as a curative measure, and that the water should be dosed at all times, so that there should be a fixed amount of residual chlorine. It does not appear, however, that such serious pollution of the water as led to the epidemic is constant. The typhoid epidemic appears to have been due to the fact that a very heavy rainfall caused an excessive flow of polluted water from the Calumet River to flow into Lake Michigan, this river being badly polluted by the towns above, and that heavy winds blew at the same time directly towards the water intake. Dr. Bundesen, of the Department of Health, states that it is impracticable to control the chance of pollution of the lake water, and that similar epidemics are likely to be experienced at Chicago unless the water is filtered. It is probable, although it is not so stated, that the very small dose of chlorine given was due to the fact that tastes and odours resulted from a heavier dose. Mr. H. F. Ferguson, chief engineer of the State Board of Health, and Dr. Isaac D. Rawlings, director, advise that studies of the organic content of the lake water should be made in order to counteract tastes and odours resulting from treatment. It is also recommended that consideration should be given to the installation of filters to clarify and purify the water before chlorination."

Van Breemen (M. L.) & Mom (C. P.). **De sterilisatie van drinkwater door chloor.** [Sterilization of Drinking Water by means of Chlorine.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 6. pp. 951–969.

Chlorination is generally recognised as an efficient method of sterilizing drinking water. The authors recommend the use of *Caporit* (Bayer), a preparation of great stability, containing over 50 per cent. active chlorine, on which, according to the authors' experiments, its action depends. It dissolves readily and makes the complicated apparatus used for adding chlorine gas to water superfluous. Besides that, it is cheaper than chlorine.*

Tomb (J. W.). **A Practical Method of Preserving Chloride of Lime in India.**—*Indian Med. Gaz.* 1924. Feb. Vol. 59. No. 2. pp. 84–85. With 1 fig.

The writer gives a description of a particular jar which he uses for storing chlorinated lime in the tropics. It can be obtained from Messrs. Burn & Co., Raniganj. It is obviously adequate, but we should like to point out that if users of chlorinated lime would specify that it be mixed with 10 per cent. quick lime in the works it is very doubtful whether air-tight jars are necessary at all.

* Summarized by Dr. W. J. Bais.

FOOD.

Hale (Harrison) & Bleecker (William L.). **Active Chlorin as a Germicide for Milk and Milk Products.**—*Jl. Agric. Res.* Washington. 1923. Nov. 24. Vol. 26. No. 8. pp. 375–382. With 1 chart & 3 plates. [3 refs.]

The writer describes experiments that were made in the use of chlorine in the sterilization of milk. We do not give the details because we are extremely doubtful whether its use is likely to become general. The conclusions reached are given below. It may also be noted that the ortho-tolidin test for chlorine, which claims to operate in 200,000,000 parts of water is useless in milk. Starch iodide one part in 160,000 works satisfactorily.

"1. Active chlorin does act as a germicide in milk and in ice cream with a reduction in the number of bacteria in general proportional to the amount of active chlorin present.

"2. Chlorin water gives as satisfactory results in 45 minutes as sodium hypochlorite does in 90 minutes, or calcium hypochlorite does in 19 hours. The chlorin water could be used in higher concentrations than the other two without an effect upon the flavor.

"It is not the wish of the authors that this paper be considered in any way as a recommendation of chlorin for treating market milk. Much more work must be done before any final decision can be reached. We hope our results may stimulate further research."

Weber (F.). **Essai de réhabilitation du lait Marocain. Son hyperacidité naturelle n'est-elle pas un mythe ?**—*Maroc-Medical.* 1923. Jan. 15. No. 13. pp. 13–15.

The writer discusses the chemical composition of cow's milk in Morocco and compares it with that of cattle in France.

CONSERVANCY.

Temple (Frederick Charles). **Drainage of Country Towns in the Plains of India.**—*Surveyor & Municipal & County Engineer.* 1924. Feb. 29. Vol. 65. No. 1676. p. 242.

"For final disposal, pumping systems have more choice of site than gravity systems. In the past the absence of attempts at sullage disposal and the assumption that the outfall necessarily would be a source of nuisance have adversely affected the design of whole schemes. Town planners and welfare workers are now dissatisfied with the economic loss of the manurial value of waste liquids. India is particularly well adapted to disposal on land. Some caste difficulties have to be overcome, but the possible return can be worth while. Sullage is already taken for intensive garden cultivation; the methods are primitive and incomplete, giving rise to nuisance, but they are capable of improvement.

" The area of land required is 1 acre for every 5,000 to 10,000 gallons. Compared with average English figures this is low. Possibly it is due to the high absorbent power of the land and the low humidity robbing the already highly-concentrated sullage of the water necessary for purification. The average quantity of water used is 3 to 5 gallons per head from wells and 10 to 20 gallons where there is piped supply. The quantity of sullage for disposal from a well supply is 1 to 2½ gallons per head. Sullage disposal may occasionally bring in a small revenue, if worked by garden cultivators ; usually, however, it will be worked at a slight loss.

" For ease of sullage disposal numerous outfalls generally are to be preferred. Natural drainage lines should be followed wherever possible, except that sullage outfalls should be kept as high as possible to make irrigation over land practicable. Special difficulties are met with in riverside towns. Most of the town slopes away from the river, and the problem of sullage disposal on the part sloping to the river has not yet been solved.

" Some outfalls are so bad that no satisfactory scheme is possible without pumping. The limiting gradient is 1 in 500 ; flatter slopes than this are too difficult to clean. Subject to this gradient, outfalls should be kept as high as possible. Extreme care is necessary to use all available fall to the best advantage. It is occasionally desirable to cut through a natural watershed. Local hollows must be protected by catch-water drains. A very small drain is the best size for sullage, while for monsoon flow a very large area is required. A compromise is struck by allowing for a ¼-in. discharge of rainfall per hour. Occasionally outfalls may be designed for ½ in. per hour. A V-shaped cross section is recommended . . .

" A satisfactory capacity for disposal works, calculated per head of population served, is 2 cubic ft. per user for the septic tank and 3 cubic ft. per user for the filtering medium, for a rate of 5–40 gallons per head dilution, provided the sewage is fresh. Brick ballast only is available as a filtering material in many places."

Surveyor & Municipal & County Engineer. 1923. Oct. 19. Vol. 64. No. 1657. p. 285.—**Sewage Treatment : Need for State Research Work.**

" This country ' cannot afford to go on spending £7,000,000 per annum on works of sewerage and sewage disposal without the fullest guidance science can give.' We most heartly support this opinion expressed by Mr. A. J. Martin in his paper to the Institution of Civil Engineers on the bio-aëration of sewage, of which an abstract is given elsewhere in these pages. Mr. Martin has dealt with his subject wisely and impartially. He reviews the different methods, and concludes his paper and argument by showing the need for following up the valuable investigations already made, by carrying out researches on a scale worthy of the subject. He shows that in no department of applied science is the need for research work more pressing than in that of sewage treatment. The Royal Commission on Sewage Disposal urged the creation of a central authority competent to undertake this work, but since the final report was published the whole subject has been revolutionized by Dr. Fowler's discovery of activated sludge treatment, or the bio-aëration process. Other workers, like Mr. Haworth, of Sheffield, and Mr. Bolton have shown the practicable possibility of treating

sewage by methods which differ from those adopted by Dr. Fowler, working apparently on the same theory. If the need for research work was recognised at a time when the design of sewage disposal works was more or less standardized, much greater is the need for it under present conditions."

Surveyor & Municipal & County Engineer. 1924. Jan. 25. Vol. 65. No. 1671. pp. 65–86.—**Municipal Engineering in 1923.**

Activated Sludge [p. 72] :—" It may be said that while there are great differences of opinion among chemists as to the action which takes place in the activated sludge process, these differences are largely due to the different conditions under which the various workers have carried out their experiments. On the whole, it seems that the quantity of oxygen required for the process is less than the chemists at one time believed it to be. It is possible, however, that chemists, who are not engineers, may have been under the impression that the chief reason why air was blown into the sewage was in order that aëration might take place. They were probably unaware that the air bubbles were blown into the sewage because this was believed to be the most efficient method of agitating the sewage and inducing a flow. The chemist appears to be under the impression that if he can prove that the quantity of oxygen required may be reduced, a corresponding saving in power may be effected. But is this so ? Could Mr. Haworth reduce the size of his tanks at Sheffield, or do away with any of the agitating appliances, if the fact were proved ? Or would a smaller quantity of air per gallon suffice in that case for the diffuser system ? Obviously not. Whatever may be the requirements for oxygen absorption, no one has yet suggested that agitation can be diminished.

" As was shown last year by Mr. Garner, it is possible to treat sewage in such a manner that by the addition of chemicals, changes are brought about which make it possible to purify sewage containing trade wastes with less aëration than would otherwise be required, and the Huddersfield experiments showed distinctly that, in the case of activated sludge treatment, it is sometimes possible to effect great economy by combining the chemical and activated sludge processes. Another fact which is of great importance, and which is deserving of further investigation, is that which was reported by Mr. Garfield, who found that it was possible to replace chemical precipitation and grease extraction in the case of the sewage of Bradford by aëration which induced bacterial action. In short, we see here the possibility of the precipitation of sludge by means of aëration, instead of by means of chemicals."

Barreto (João de Barros). **Typos de latrinas ruraes. (These XV do 1º Congresso Brazileiro de Hygiene).** 18 pp. With 13 figs. Curityba : Placido e Silva & Comp. Ltda.

In this paper is discussed the subject of disposal of faeces in rural districts. The various types of latrines which have been installed from time to time as applicable to isolated dwellings or for small communities, and for temporary or permanent use, are mentioned.

Such questions as the nature of the soil, the means for removal and dealing with the excreta are also briefly referred to. The publication is in the main a summary of papers previously issued on the subject.*

* Summarized by Dr. H. Harold Scott.

FRUMAU (F. C.). **De Septic tanks van Soerabaia.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 6. pp. 931–944. With 2 plans.

Frumau defends the septic tank system used at Sourabaya against the remarks made by WILLE (see Sanitation Supplement No. I, 1924, p. 32). The separation screen near the inlet causes a proper washing out of the upper layers in front of this screen by the affluent, promoting the decay of this matter. In the second part of the tank the most important decomposition takes place. After deducting the height of the floating parts of the contents of the tank there remains no important difference between the depth Dr. WILLE requires (125–200 cm.) and that allowed at Sourabaya (80 cm.).

No town draining being possible at Sourabaya, all the liquid refuse has to flow off into the soil. The effluent of septic tanks generally flows over into a sewer pit, which should not however receive any rain or household waste water. For a more even spreading of the liquids in the soil these pits should be comparatively small, and in blocks of houses there should not be several tanks connected with one pit.

The difficulties which the described state of affairs gives rise to are discussed in detail, but where trouble occurred such could never be ascribed to the septic tanks if properly constructed.*

i. GRIJNS (G.). **De constructie van Septic Tanks voor de Tropen.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 1. pp. 183–185.

ii. VAN SANTWIJK (J. A.). **De Septic Tanks van Soerabaja en Semarang.**—*Ibid.* pp. 186–190. With 1 fig.

i. Grijns defends CLEMESHA'S type of septic tank against the remarks made by WILLE, using practically the same argument as FRUMAU (see above. He admits that the distance from the bottom to the level of the contents should be at least 1·20 Meter. It is essential that a sufficient quantity of water enter the tank (25 L. per user).

ii. Van Santwijk also reports favourably on this type of septic tank, but supports WILLE'S contention that the depth should be more than 0·72–0·88 M. Possible reasons of bad action of a tank are : (1) faulty dimensions or wrong dilution of the contents, (2) not filling the tank with water before taking it into use ; (3) overloading the tank, especially to begin with, before it has ripened ; (4) the use of disinfectants.*

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Feb. 29. Vol. 65. No. 1676. p. 238. With 2 figs.—**Public Service Motor Vehicles. Two-wheel Trailer for Refuse Collection.**

" The accompanying photographic views (Figs. 40 and 41) show the ' Eagle ' patent two-wheel trailer as applied for house refuse collection by the Dublin Corporation. By this system horses are used for drawing the trailers for loading operations and when full the vehicles are taken to the destructor or dump by the tractor. One tractor to three trailers is usually used. It will readily be seen that the men

* Summarized by Dr. W. J. BAIS.

collecting and loading are continuously employed, while the tractor and driver are likewise engaged the whole of the time on transport.

"For houses refuse collection these trailers—which are made by the Eagle Engineering Company, Ltd., Warwick—are usually fitted with roller bearings to lighten the draught for the horses. The illustration shows 3½ tons capacity outfits.

"The firm's patent two-wheel trailer has a number of advantages. It can be backed with remarkable ease. Secondly, the loading height is considerably reduced thus causing a large saving in filling, and with a castor wheel the trailer can be drawn by horses. The coupling, which is of a ball type, is exceedingly easy to connect up to the tractor, and the operation of changing over from horse to tractor is only a matter of half a minute or so."

FIG. 40.—The "Eagle" Patent Two-Wheel Trailer in use for house refuse collection; showing the 3½ ton size fitted with horse shafts and a castor wheel at the drawbar end.

FIG. 41.—The "Eagle" Patent Two-Wheel Trailer connected up with a Fordson or similar type of tractor for drawing load to the destructor or dump.

[Reproduced from photographs supplied by the Eagle Engineering Co., Ltd., Eagle Works, Warwick, England.]

SMALLPOX VACCINATION.

PUNJAB. **Report on Vaccination in the Punjab for the Year 1922–23.** [FORSTER (W. H. C.), Director of Public Health.]—pp. 2+6+xiv. With 1 folding chart. 1923. Lahore : Supt. Govt. Printing. [Price : Rs.1–4–0 or 1s. 8d.]

" The Java modification of my original system of lymph cultivation having been favourably reported on by the Director, Central Research Institute, after a visit to the far east, it was taken up experimentally towards the close of 1921–22. The experimental results being uniformly satisfactory the modification was adopted as standard during 1922–23. The modification consists in the introduction of the rabbit in my cow calf-buffalo calf cycle and so far has doubled the yield of a buffalo calf. Maximum potency on the cycle of alternation has not yet been attained, the indications being that the end point will be reached with a yield slightly under thrice that of the original cycle."

DISINFECTION.

STOCK (P. G.) & MONIER-WILLIAMS (G. W.). **Preliminary Report on the Use of Hydrogen Cyanide for Fumigation Purposes.**—*Ministry of Health. Reports on Public Health and Medical Subjects. No.* 19. pp. viii+84. With 17 photographs & 8 figs. 1923. London : H.M. Stationery Office. [Price 2s. 6d. net.]

——. **Some Consideration on the Use of Hydrogen Cyanide and Allied Substances, with Special Reference to International Preventive Medicine.**—*Proc. Roy. Soc. Med.* (Sect. Epidem. & State Med.). 1924. Feb. Vol. 17. No. 4. pp. 9–27. With 17 figs.

The writers give an exhaustive report of the use of HCN. in the fumigation of ships ; they have personal experience of the methods employed, as they have visited various Ports in other countries.

The report is well illustrated. The illustrations reproduced (Figs 42–48) show the various methods of using the preparations described.

Two methods of using HCN derivatives have not received much attention in other numbers. One of these derivatives, cyklon, possesses the following formula :—

Methyl Cyano-Formate (90 per cent.) + Methyl Chloro-Formate (10 per cent.)

It is an easily volatile material, something like petrol in appearance, with a strong lachrymatory power ; hence its superiority over ordinary HCN, because even in non-poisonous quantities it is capable of causing lachrymation.

The material is poured in a fine spray out of a specially designed watering can, a picture of which is given (Fig. 49), ·4 litres is required for 100 cubic metres of air space ; a long contact is necessary, namely,

about four hours, and it is not very easily removed by ventilation; 12 to 24 hours appear to be necessary. Cyklon costs 7s. 6d. per litre, so that it is rather expensive.

Cyanogen chloride has the same good points as cyklon; it also causes lachrymation. This is manufactured by adding a mixture of sodium cyanide and sodium chlorate and hydrochloride acid in the following proportions.

Sodium cyanide	4 oz.
Sodium chlorate	3 oz.
Talc	2 oz.
Hydrochloric acid	17 fluid oz.
Water	17 fluid oz.

Per thousand cubic feet.

It has been used considerably by the United States Quarantine Service.

The writers end their very able report with the following brief conclusions.

"In their preliminary report the Board appointed by the Surgeon General of the United States Public Health Service to investigate the subject of fumigation of ships, have laid down certain requirements which the ideal fumigant should meet.

FIG. 42.—The "Dumping" Method.

Deck of vessel prior to fumigation. Fumigator ready to lower into a barrel in the hold a charge of solid cyanide contained in a bag. This "dumping" method is largely used in the United States for the fumigation of holds of vessels, but is not advocated unless carried out in spaces with immediate access to the open air, and by trained operators.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]

" Briefly, these requirements are as follows.

" High toxicity; easy detection, by the senses, in sublethal concentrations; harmlessness to goods; efficient penetrative qualities; non-persistence; reasonably low cost; furnishes no fire or explosive hazard; ease of manipulation. It should also be non-corrosive to metals and harmless to fabrics.

" With these requirements we agree, but we have not yet sufficient experience to say whether under the conditions of practical fumigation cyanogen chloride gas mixture meets them or not.

" We trust, however, that we shall soon have an opportunity of investigating the practical use of this gas. For the present we defer other expressions of opinion to a further report.

" Cyklon appears to meet many of the requirements, but unless time is no object, takes too long to clear. Whether it could ever be used on a large scale would also depend on its relative cost and availability of supplies. We understand that up to July, 1922, some 14 vessels as well as a number of buildings had been treated with cyklon at Rotterdam and we think that its further use should be closely followed.

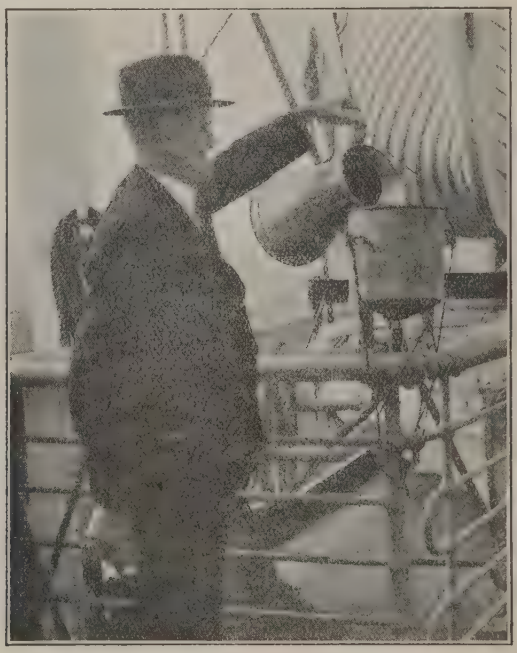

FIG. 43.—The Solution Method.

Operator pouring solution of cyanide into a single funnel rigged on the boat deck. Note the rubber pipe from the bottom of the funnel passing outside and down over the side of the ship to the barrel in the hold, which contains the acid solution.

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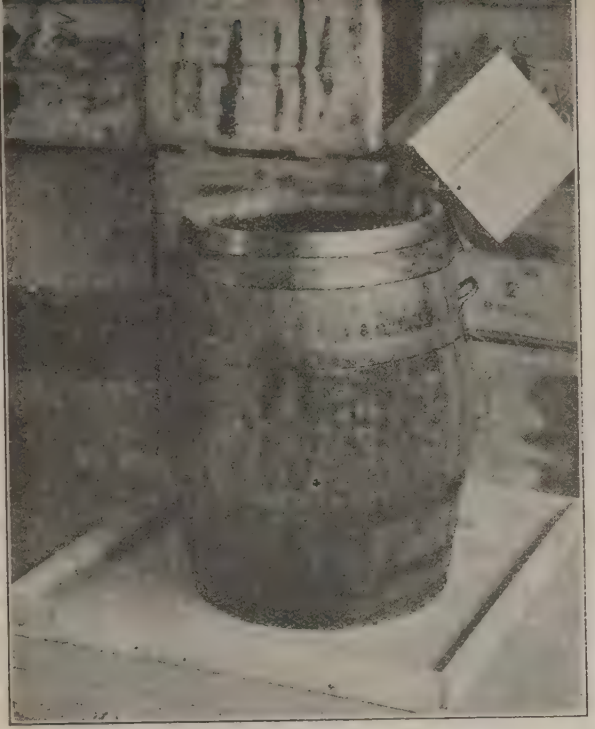

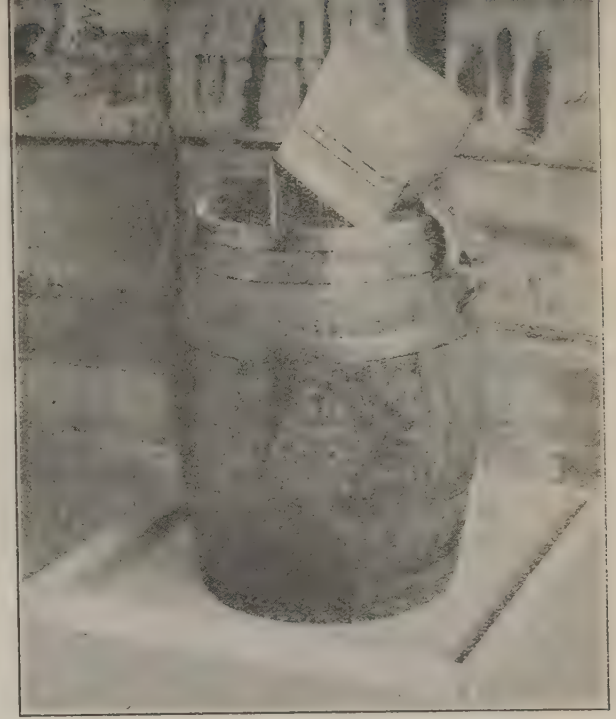

The " Tipping " Method.

FIG. 44.—Type of barrel used in Great Britain with " tipper " attached in which charge of solid cyanide is placed. The tipping is performed from a distance by means of ropes or wires attached to the containers, the operator standing inthe open air.

FIG. 45.—A barrel showing position of container after tipping.

Note.—The hinge cover has swung open, allowing the cyanide to fall into the barrel.

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(Photographs kindly supplied by Messrs. Siebe Gorman & Co.)

Liquid Hydrogen Cyanide Method.

FIG. 46.—The liquid [hydrogen cyanide is here stored in steel cylinders weighing, when full, about 200 lb. and containing 70 lb. of the liquid. In the photograph two such cylinders are "lashed" to the rail. Note the flexible pipe connecting the outlet valve of one cylinder to a portable container of a capacity of 25 lb. The operator protected by mask is about to start pumping air into the cylinder and so fill the container.

FIG. 47.—Portable container ready for use. Note the distributing spray in left hand of operator. This spray, consisting of a metal pipe fitted with four spray nozzles, is connected to the outlet flexible pipe and the "tyre" pump for emptying the container is connected to the inlet valve.

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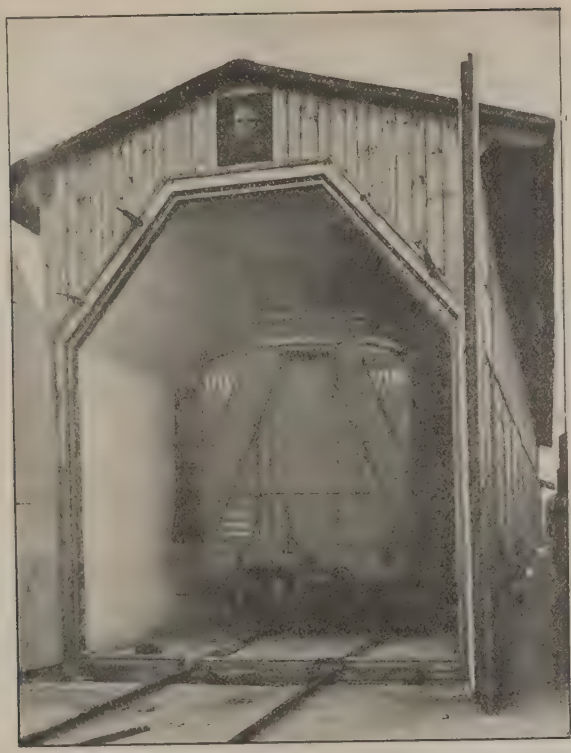

FIG. 48.—Chamber or tunnel constructed by the local authorities in Warsaw in 1920 for hydrogen cyanide fumigation of railway carriages. The chamber is large enough to contain several railroad cars and can be hermetically closed. After fumigation the gas is withdrawn from the chamber by means of fans and passed through a stove where it is burnt.

[Reproduced by permission from the *Proceedings of the Royal Society of Medicine* (Section of Epidemiology and State Medicine).]

Summary and Recommendations.

"In this report we have referred only to the more important considerations in regard to the practical use of hydogen cyanide for fumigation purposes. We have no doubts as to the efficacy of the process, if properly carried out, or as to the danger unless every precaution is taken. For the present we consider that the application of the process must be classed with other hazardous occupations. The lines on which safety rules may be laid down have already been indicated, and the advantages of a system of licensing firms operating the process have been insisted on. Investigations are necessary particularly in regard to the diffusion of the gas and means of artificial ventilation.

"Without further experience we do not feel justified in expressing definite opinions either in regard to the Glen Liston apparatus, or the use of cyanogen chloride. If the hopes entertained for the cyanogen

chloride mixture are fulfilled, it is probable that it will replace hydrogen cyanide as a fumigant. We trust that we shall have opportunities for further investigation.

" There remain two other points to which reference must be made. The first is a suggestion put forward by Engineer de Bruyne, of Rotter-

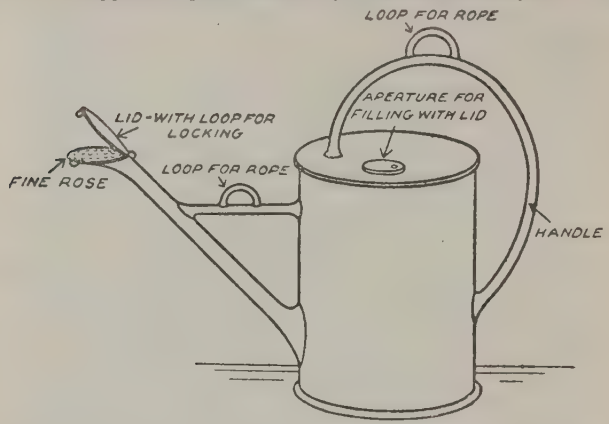

Fig. 49.—Specially constructed copper " watering " can or sprinkler for use in distribution of cyklon. Each can is fitted with a fine " rose " and is so constructed that it can be easily emptied. The " rose " is covered with a closely fitting hinged lip which is open only when the can is in use. Metal loops are also provided to which ropes can be attached when the can has to be lowered.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]

dam, that when new ships are designed, the question of the future fumigation should be borne in mind. The second is a tendency evinced by American authorities to relax their requirements as to periodic fumigation in the case of vessels which are constructed with a view to rendering them free from rat harbourage. We have had no opportunity of considering these suggestions. On certain vessels there are arrangements for fumigating the holds with sulphur, but this is perhaps not quite the same thing. We are a little doubtful whether, in the absence of definite data, it would be possible to interest naval architects in the matter, but it is worth while to pursue the question further."

INFANT WELFARE.

Fabella (José). **La situation de l'enfance aux colonies. La protection de l'enfance dans les îles Philippines.**—*Bull. Internat. de la Protection de l'Enfance.* 1924. Apr. 30. No. 25. pp. 350–359.

The writer describes the arrangements made for Infant Welfare work in the Philippines. In 1921 there were 80 Welfare centres, in December 1922 there were 183, and 146,752 mothers and infants profited by the work, and now the number of centres is nearly 250 and half a million persons benefit. There are three different categories of centres—(1) those worked directly by the " Commissaire de l'Assistance

Publique," (2) those directed by provincial councils; (3) those maintained by private organizations with help from government. The depôts are classified also according to their functions and to the activities which they undertake. Thus class

(*a*) Employ doctors who give consultations two days a week and a nurse who is whole time in the Institution and who makes domiciliary visits.

(*b*) Centres that have a whole time nurse and a doctor whose services are not regular but are available occasionally.

(*c*) Centres where the nurse gives part-time work and spends the remainder in visiting patients in their homes.

(*d*) Centres similar to the above but where the services of qualified persons cannot be guaranteed because of lack of funds.

	1918.	1919.	1920.	1921.	1922.
Population ...	9,943,418	10,101,371	10,259,325	10,465,822	10,547,349
Infant mortality per 1,000 children born ...	262	235	160	168	154

Under the same branch of the service are large orphanages, and much propaganda work has been started, such as "cleanliness weeks," etc.

RADEMAKER. **Etat de l'enfance aux colonies. Rapport sur la Guyane hollandaise (le Surinam).**—*Bull. Internat. de la Protection de l'Enfance.* 1924. Apr. 30. No. 25. pp. 360–367.

The author gives an account of the mortality rates in Dutch Guiana. His conclusions are that the maternal mortality is not great, but that help and assistance for women about to become mothers is not available; that government will always provide suitable staff and assistance if the people will make use of it; that the only way to increase the benefits to mothers and infants is to combat venereal disease and to combat tropical diseases and the superstitutions and prejudices of the people.

It is also desirable to punish all midwives acting without qualifications.

Special government measures are (1) the foundation of a school for trained midwives; (2) free treatment by midwives, pre-natal, at birth, and for nine days after; free consultation at state hospitals before and at birth, if desired; treatment of the infants at the polyclinics in the towns and plantations.

WISHART (W. de W.). **Infant Welfare Work in Georgetown, Past, Present and Future.**—*British Guiana Med. Annual for 1923.* pp. 35–42. With 1 chart.

This article is largely historical. Last year a crèche was established by the Baby Saving League. The health visitors consider that during the past five or six years the standard of motherhood has been steadily improving, breast feeding being now the rule, not the exception, cleanliness of the home is considerably improved, and whereas formerly they were looked upon with suspicion, they are beginning to be wel-

comed as friends. The following table shows that the mortality figures amongst those visited by the health visitors are very much lower than amongst the less fortunate population :—

Year.	General infant mortality rate.	Mortality rate for infants visited.	Percentage reduction in rate of infants visited.
1915	228	156	31·5
1916	204	132	35·4
1917	216	94	56·4
1918	248	145	58·8
1919	212	109	48·5
1920	212	156	38·6

MINETT (E. M.). **Infantile Mortality.**—*British Guiana Med. Annual for 1923.* pp. 148–150.

The infant mortality in British Guiana does not appear to differ very materially from that in other parts of the tropics, though there appears to have been a considerable reduction in the figures during the last few years, due to the Baby Saving League and to the health visitors appointed by the corporation. There are now 22 nurse midwives working throughout the colony. The writer quotes recommendations of a committee of the British Medical Association.

" 1. That the effect of many of the causes of infant mortality can be lessened by the education of women at centres and in their homes.

" 2. That the instruction of the elder girls at school in home craft and in mother craft should be developed and encouraged.

" 3. That every effort should be made to improve the prospects of midwives, and that encouragement should be given to them by local authorities whenever there is difficulty in securing a sufficient supply."

BARY (Helen V.). **L'hygiène maternelle et infantile à Porto-Rico et dans les îles Vierges.**—*Bull. Internat. de la Protection de l'Enfance.* Brussels. 1924. Mar. 31. No. 24. pp. 199–213.

ADAM (M.). **État de l'enfance aux colonies. [Afrique occidentale française.]**—*Ibid.* pp. 214–226.

VASSAL (Gabrielle). **Natalité et protection de l'enfance en Afrique équatoriale française.**—*Ann. d'Hyg. Publique, Industrielle et Sociale.* 1924. Jan. New Ser. No. 1. pp. 43–48.

The above three articles discuss the causes of infant mortality and the remedial measures necessary in Porto Rico and the Virgin Islands, in Dakar, the French African Colony, and in French Equatorial Africa.

ENCISO (Enrique). **Mortalidad infantil en Bogotá.**—*Repert. de Med. y Cirug.* Bogotá. 1923. Dec. Vol. 15. No. 3. pp. 144–152. With 3 text figs.

Infantile mortality in Bogotá is very high ; in 1920 it was 220·52 per mille, and this was a favourable year in that there was no measles or whooping-cough. 41·64 per cent. of the births are illegitimate, and

the high death-rate is largely due to poverty, ignorance and neglect. The feeding is faulty, the milk supply is bad, and, as a result, the chief cause of death is gastro-enteritis. Pulmonary diseases rank second and closely approximate the former in those years in which measles and whooping-cough are prevalent. Records show that measles attacks Bogotá only once in every eight years, but when it does so the epidemic is severe and the death-rate high.

The remedies suggested are the giving of help to nursing mothers, the establishment of child-welfare centres, and the safeguarding of the milk supply.*

Souza (G. H. de Paula). **Algumas considerações sobre a mortiladade infantil em São Paulo.** [Infantile Mortality in San Paulo.]— *Ann. Paulist. Med. e Cirurg.* 1923. Dec. Year 11. Vol. 14. No. 12. pp. 191–225. With 2 charts.

The infantile mortality rate in San Paulo is very high, 180 per 1,000. The chief causes are poverty and distress of parents, with the attendant factors of mal-nutrition, unhealthy dwellings, want of skilled assistance in childbirth, hereditary disease, and so forth. Diarrhoea and enteritis are noted as accounting for nearly half the total deaths (48·02 per cent.). The author rightly lays stress on the principle that measures for infant protection and welfare should constitute part of the general hygiene of the State, should start in pre-natal days and extend through birth and on to adolescence with continuity of action. The remainder of the paper is devoted to statistical tables relating to the various diseases registered as causes of death, under the various relevant systems.*

MEDICAL INSPECTION OF SCHOOLS.

Sharp (C. G. Kay). **Medical Inspection of School Children in Natal. A Brief Retrospect.**— *Jl. State Med.* 1923. Sept. Vol. 31. No. 9. pp. 437–438.

The writer gives some interesting figures of the results of inspection of schools in Natal in 1913. The percentages of sickness in the school of Durban are given as follows :—

" Adenoids, 35·5 per cent. ; tonsils (much enlarged), 17 per cent. ; eyes (defective vision), 3 per cent. ; total defective children (all causes), 37 per cent. . . . .

. " In 1921, the following percentages of defectives were found amongst 6,500 school children examined by Dr. Mary Baird, Assistant Medical Inspector of Schools, and myself : Adenoids, 8 per cent. ; tonsils (much enlarged), 9 per cent. ; eyes (defective vision), 4 per cent. ; nits, 4·6 per cent. ; teeth (bad), 18 per cent. ; total defective (all causes), 20 per cent.

" Zulus in training as teachers in the Native Training Colleges showed a defective percentage of 4 per cent. teeth and 11 per cent. defective eyesight."

From the above it would appear that about 50 per cent. of the total disability has been removed owing to the work of the school medical officers.

* Summarized by Dr. H. Harold Scott.

PONS-LEYCHARD. **Sur un essai d'organisation de soins dans les écoles d'Algérie.**— *Arch. Inst. Pasteur d' Algérie.* 1923. Dec. Vol. 1. No. 4. pp. 699–703.

Since 1922 and '23 special attention has been paid to the condition of the scholars in three selected schools in Algeria, at Montagnac, Lavayssière and Hennaya. Attention was concentrated on ringworm, trachoma and malaria. The children were very carefully examined and treated at school on the usual lines. At Hennaya, out of 326 boys and girls, 60 had enlarged spleens. Lessons in hygiene and the spread of these diseases formed part of the curriculum. The writer, commenting on the attitude of the people generally towards malaria, divides them into 3 classes, namely, (1) those who know the cause and combat it ; a very small number, (2) those who know but do nothing (this class includes a very fair number of Europeans and a still smaller number of natives, mostly indolent and intensely fatalistic), and (3) those who are entirely ignorant ; the great mass of the population.

REPORTS AND STATISTICS.

MINISTRY OF HEALTH. **On the State of the Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1922.** [NEWMAN (George).]—186 pp. 1923. London : H.M. Stationery Office. [Price 2s. 6d. net.]

" 1. The number of births registered in 1922 was 780,124, which showed a decline of nearly 70,000 births on 1921, and 170,000 on 1920. The birth rate was 20·4.

" 2. There was a death rate of 12·8, which is slightly higher than in 1920 or 1921. The expectation of life at birth is now 11 years greater for males and 13 years greater for females than it was 60 years ago.

" 3. The infant mortality rate (77 per 1,000 births) is the lowest yet recorded in this country and indicates a saving of not less than 40,000 lives over and above the number that would have been saved had the average rate for 1901–10 continued. There is still much unnecessary loss of life both of mother and infant (particularly in the first month of infancy).

" 4. The number of cases of epidemic and infectious diseases notified in 1922 was 422,955. Diphtheria, enteric fever, cerebro-spinal fever, encephalitis and tuberculosis showed a decline during the year ; but measles, pneumonia and scarlet fever still remain high.

" 5. There appear to be good grounds for believing that venereal disease, though not notifiable, has declined. Cancer, unfortunately, has substantially increased. The toll of respiratory diseases, diseases of the heart, diseases of the nervous system and tuberculosis still remains formidable. Deaths from these four diseases under 45 years of age are largely preventable. There is also a large mass of disability and physical and mental incompetency from relatively trivial sickness, much of which is neglected and this leads to more serious conditions in later life. The expenditure on sickness and disablement benefit and other similar returns denote that a very serious amount of time is lost in employment, amounting to not less than 375,000 years per annum for the insured population only. This is but an indication of the heavy claims which sickness makes upon the productive power of the nation year by year.

" 6. The problem lying immediately before the Local Authorities responsible for the sound administration and practice of preventive medicine is, first, to rear and maintain a healthy race of people; secondly, to continue their attack upon infection and all forms of preventable sickness and invalidity; and, thirdly, to recognise that the public health is the primary asset of the nation's welfare, whether measured by employability and production or by length of days and personal well being."

Ship borne diseases.—Several cases of smallpox were imported during the year, a lascar from Bombay, an unvaccinated child from Canada and several of the crew of the ship " Odessa." The crew was paid off and some members contracted the disease after going ashore.

Malaria.—The steamship " Hunstanworth " returned from the west coast of Africa early in November. The master and several members of the crew had to be landed at Las Palmas suffering from malaria. On arrival at Sheerness on the 17th November all but two members of the crew were down with the disease. Two men died after reaching England and the remainder of the crew were treated in hospital, very seriously ill. The disease was contracted by carrying about 120 negroes up the river from Rufisque on the west coast of Africa.

The Norwegian vessel, the " Frey," arrived at Bristol with 20 cases of malaria aboard.

Plague.—The S.S. " Warwickshire " arrived at the port of London from Rangoon, landed her passengers and proceeded to Liverpool. At the latter port 23 dead rats were found in one of the aft holds. These were shown to have died from plague. No human cases resulted. It seems probable that the infection was taken on board at Colombo in some cocoanut fibre.

On March 26th the " City of Genoa " arrived from Karachi. Three deaths from plague had occurred amongst the crew on the voyage; no extension of the disease occurred.

The steamship " Elpinor " arrived at Liverpool from China. Rat trapping was carried out on board, one plague rat was caught.

The steam ship " Ardeola " arrived at Liverpool from Las Palmas. Rat searchers sweeping out the hold found 4 dead rats, which proved to be plague infected. The vessel was fumigated and 16 rats were found, 8 of which were plague infected. The cargo consisted mainly of bananas, tomatoes and potatoes.

The steam ship " Portia," from Rosario, which called at Montevideo, reported at Gravesend that an apprentice age 20 was taken suddenly ill and died, under circumstances suggesting plague, and was buried at sea. The vessel carried only grain. The Medical Officer of Health considered that the rats caught on board were plague infected. This was not confirmed by further bacteriological results.

The following large vessels have been recently fumigated with HCN in England. In one case there was an accident resulting in the loss of 2 lives. It seems rather doubtful how this took place, considering the precautions that were taken, especially as the men were provided with oxygen breathing masks, which were in perfect order:—

	Tons.		Tons.
Scythia ..	19,700	Berengaria ..	52,000
Baltic	23,900	Dakotan ..	8,000
Majestic ..	56,000	Aquitania ..	45,600
Adriatic ..	24,500	Mauretania ..	30,700

* The accident occurred in the last-named vessel.

AIR MINISTRY. **Report on the Health of the Royal Air Force for the Year 1921.** [MUNRO (D.), Director of Medical Services.]—pp. iv+80. With 5 charts. 1923. Feb. Air Publication 934. London: H.M. Stationery Office. [Price 5s. net.]

The following interesting paragraphs are taken from the annual report of the Royal Air Force.

"*Sandfly Fever.*—Table 14 shows the monthly case incidence of sandfly fever in the geographical areas abroad in which it occurred during 1921, and also the corresponding ratios per 1,000 of strength during 1920. In Malta, while the yearly case incidence was slightly reduced, there was a higher case incidence in July and August than

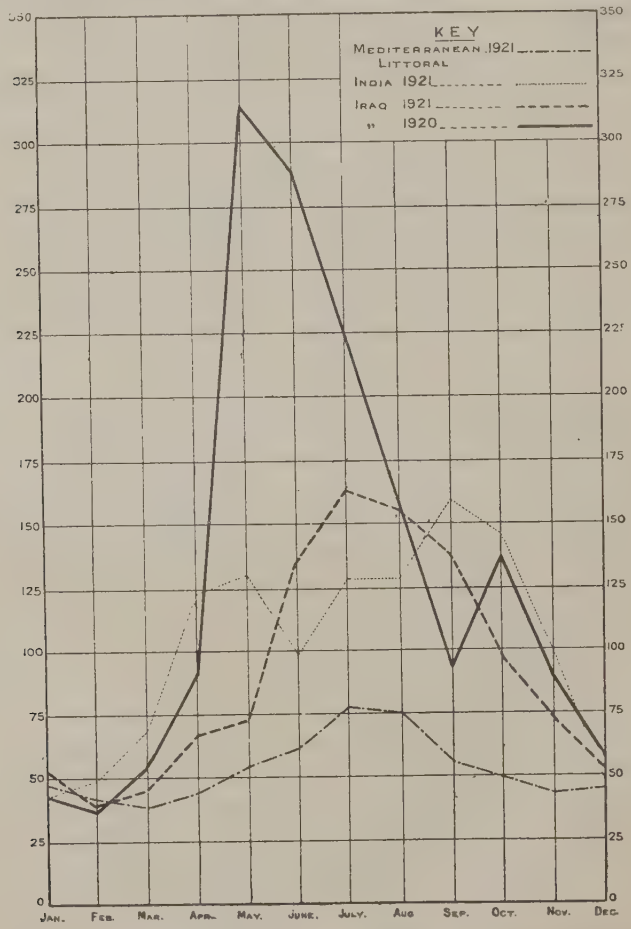

FIG. 50.—Chart showing monthly case incidence of sickness in ratios per 1,000 of strength of Royal Air Force personnel in geographical areas abroad for 1921 and for 'Iraq in 1920. (Cases of 48 hours or less duration are excluded.)

[Reproduced from *Rept. on the Health of the Royal Air Forces for the Year* 1921, by permission of the Controller of H.M. Stationery Office.]

in 1920. The second outbreak, in September, 1920, was absent in 1921. In Egypt and Palestine, the yearly case incidence is practically identical with last year, and the monthly case incidence in the two years calls for no comment. The very marked reduction of the case incidence in Iraq for 1921, compared with 1920, is shown in Chart 5, page 39. Table 13 shows the case incidence in stations abroad. Judging from the experience of the past few years, it would appear that the severity of sandfly fever outbreaks in Iraq vary markedly from year to year, and, consequently, it is impossible to say how much the lowered case incidence was due to the prophylactic measures taken. Apart from these measures, there were other factors which probably played their part in lessening the incidence of the disease. The type was undoubtedly milder than in 1920, and also the huts in that year were mostly new and had not had time to dry, thus possibly forming a more suitable *nidus* in which sandflies could live and breed. A bigger proportion than in 1920 of personnel had already spent one period of hot weather in Iraq. In practice, it is usually found that the disease is commoner and of a more severe type in personnel fresh to the country. General prophylactic measures such as regular spraying of quarters, application of preventive ointments, wearing of slacks after sundown, prevention of moisture near huts, covering of sumps, limewashing buildings both in spring and midsummer, placing beds towards the centre of rooms away from the walls, and, lastly, an adequate supply of overhead fans in quarters, have all undoubtedly helped to lower the case incidence. . . . .

" *Heatstroke and Sunstroke.*—In practice it has been found that many cases have been reported by medical officers during the hot weather from Egypt and Palestine, Iraq and India, which were, in their opinion, undoubtedly caused by the direct, or less often the indirect, action of the sun's rays. Owing to their comparative mildness, however, these cases did not warrant the terms ' Sunstroke ' and ' Heatstroke ' as generally understood, being applied to them, the only diagnoses available in the official Nomenclature of Diseases. It was consequently decided to introduce the term ' Heat Exhaustion ' to cover this mild type of case. The usual symptoms are comparatively slight pyrexia, dizziness, intense headache and pain in the back and limbs, accompanied by varying degrees of collapse. At the same time the attention of medical officers has been drawn to the fact that the term ' heat exhaustion ' should not be used indiscriminately, as a simple method of diagnosing sudden pyrexias, which in many cases appear to be mainly due to constipation. In all cases where the term is used instructions have been issued that the previous history of the case should contain sufficient information to warrant the diagnosis of heat exhaustion being made. During the sandfly fever season heat exhaustion and sandfly fever cases are apt to be confused. The differential diagnosis rests mainly on the fact that sandfly fever cases show a leucopenia with a relative lymphocytosis in the early stages of the disease. The terms ' Heatstroke ' and ' Sunstroke ' together with their text book synonyms ' Insolation ' and ' Thermic Fever ' are now reserved for the variety in which the onset is sudden, usually accompanied by hyperpyrexia, with or without cerebral symptoms and unconsciousness. This classification was not in use during 1921 but will be used in future reports.

" During 1921, 82 cases occurred overseas, with 6 deaths. Twelve cases were reported from Egypt and Palestine, compared with 24 in

the preceding year. Thirteen were reported from Malta. Thirty-eight cases occurred in Iraq, with 3 deaths ; 18 cases, also with 3 deaths, in India. A single case occurred on board ship. . . . .

" *Glare and Its Effects.*—Work carried out during 1921, mainly in India, appears to indicate that the glare of the tropics brings about a diminution in the range of accommodation, and lack of proper power of co-ordination of the extrinsic ocular muscles. These conditions in pilots lead to deterioration in landing capacity, more especially if defects in accommodation and ocular balance have previously existed. As mentioned in last year's report, the ordinary tinted glasses are useless, because they cause unnatural landscapes ; in fact, the average pilot usually removes them when landing. Samples of special Crookes' glass, U.B. and U.D. types, were issued to India and Egypt during the year, and the reports received were unanimously favourable. The two types vary only in degree of tint ; and it is interesting that in Egypt the darker type was preferred, while in India the lighter type was selected. This can be accounted for by the lighter colour of the ground (sand) in Egypt. Further quantities have been manufactured, and it is hoped that by universal issue to flying ranks, the effects of glare will be largely eliminated as a factor in bad landings."

Union of South Africa. **Department of Public Health. Report for the Year ended 30th June, 1923.** [Mitchell (J. A.), Secretary for Public Health and Chief Health Officer.]—39 pp. 1924. Pretoria : Govt. Printing & Stationery Office.

" The financial stringency has also, in varying degree, affected sanitation and public health measures in most centres throughout the Union. Many local authorities have reduced their public health and sanitary staffs or have restricted their health expenditure in other directions. In a number of instances municipalities which previously had in operation a departmental system of night-soil and refuse removal, with duplicate night-soil pails, have fallen back on the old and unsatisfactory contract system, carried out with tank-carts and single pails, which, in the nature of things, are never properly cleansed or disinfected. These and similar retrograde movements are likely to have a definitely prejudicial effect on the public health of the urban population of the Union. It is a regrettable fact that in bad times expenditure and activities in connection with public health and sanitation are usually amongst the first to be restricted."

Enteric or typhoid fever.—" A serious epidemic, comprising some 129 European and 7 native cases, occurred in Durban during the four weeks ended 21st October. The cases occurred in all parts of the borough. There were facts and circumstances casting suspicion on both water and milk as vehicles of spread of the infection, but the cases were not localized to any area with a water supply from a particular source or confined to persons obtaining their milk supply from any particular dairy. The outbreak and all the circumstances connected therewith were carefully investigated by officers of the Department, in conjunction with the municipal health authorities, but it proved impossible to arrive at any definite conclusion as to the primary source of the outbreak. An important fact elicited by the investigation was the large percentage of natives employed in Durban dairies whose blood gave a positive reaction with the Widal test. Everything possible was done by the municipality and all concerned to arrest the outbreak and to prevent a recurrence.

" A very sudden and virulent outbreak occurred during November amongst the boarders and staff at St. John's School, Frere, Estcourt District. Out of a total of 50 pupils and 21 staff, 39 pupils and 13 members of the staff were attacked—all within a period of a week or so. The outbreak was investigated by local medical officers and health officer of the Department; the infection is believed to have been conveyed to the school by a person from Durban, and its rapid spread was probably due to the specific contamination of food stuffs.

" In January and February a small outbreak (9 cases) occurred at the Kaalplaats Diamond Diggings, near Vereeniging. The arrangements hitherto in operation for maintaining reasonable cleanliness and sanitation in alluvial diamond diggings have been very unsatisfactory; it is, indeed, somewhat surprising that outbreaks of enteric and other filth diseases at such diggings are not more frequent."

Malaria.—" In the malarial areas of the northern Transvaal the types of inhabitants and the living conditions may be grouped into three classes:—

" (*a*) The well-to-do European rancher, who has his residence at a good distance from water-courses or collection of water, recognizes the danger of malaria, and takes proper precautions; he, his family, and native employees usually suffer little.

" (*b*) The European settler, more or less of the ' poor white ' class, who is totally ignorant of malaria prophylaxis, and who prefers to live as close as possible to the domestic water supply and his irrigation furrows; the incidence of malaria is particularly severe among people of this type and amongst their native employees.

" (*c*) Natives under kraal and tribal conditions (far outnumbering the European settlers and the natives on lands owned by Europeans) living in areas specially reserved by Government for their occupation. Malaria among these is severe during exceptional seasons, and owing to the configuration of the country they cannot easily avoid the disease by temporarily shifting their residence. The incidence of the disease is not, however, so severe among these natives as among the settlers of the ' poor white ' type and the native employees resident on their farms."

Plague.—" A survey of the surrounding country to a radius of about a hundred miles from this focus of infection was then made, and the results charted. It has been found possible for trained rodent inspectors to make rapid surveys of this kind by going over the country, noting the presence or absence of surface indications of gerbilles and other wild rodents, and the proportion of deserted burrows—the surface observations and deductions therefrom being from time to time checked or verified by excavations and the finding of remains of rodents. Our experience indicates that extensive mortality in gerbille colonies can be safely attributed to plague; no evidence of any other fatal epizootic disease among them has so far been discovered. Useful information can also be gained by examining the excreta of the yellow mongoose (*Cynictis penicillata*). This animal, which, like the suricat, is not a rodent but a carnivor, lives on friendly terms with the gerbilles and does not attack them so long as they are healthy, but it kills and devours the sick and eats the carcasses of dead gerbilles. Under natural conditions it appears rarely, if ever, to contract plague. Its usual food consists of insects, lizards, small snakes, birds' eggs, etc. Where a mongoose has devoured dead gerbilles, its excreta show the fur of these animals; furry mongoose dung has come to be regarded

by our plague staff as strongly suggestive of sick gerbilles and plague. The time which has elapsed since an outbreak of plague has overtaken a gerbille colony can usually be estimated from the appearance of the excreta and burrows, the amount of denudation of the mounds of earth, and the growth of vegetation thereon. . . . .

" Observations and experience during these surveys point to the conclusions that during the spread of plague amongst wild veld rodents the heaviest mortality is amongst gerbilles (*Taterona lobengula*) and multimammate mice (*Ratus coucha*) ground-squirrels [*Xerus* (*Geoscirus*) *capensis*] being only occasionally infected, and that common water-rats (*Otomys irroratus*), mole-rats (*Cryptomys*) and Eastern Karroo rats (*Barotomys luteolus*) rarely show mortality, except when living in close proximity to infected gerbille colonies. In some parts surveyed, Eastern Karroo rats were very numerous ; it is a fortunate circumstance that under natural conditions plague does not readily spread amongst them. It has been found that spring-hares (*Bedetes caffer*) disappear from an area concurrently with a plague epizootic amongst gerbilles ; up to the present none of these animals have been found definitely plague-infected. Several dead white-footed rats (*Mystromus albipes*) have been found in the vicinity of plague-infected gerbille burrows. There is evidence from two or three localities that rock-rabbits or ' dassies ' (*Procavia capensis*) have been seen dead and have disappeared from places where they had been numerous for years, concurrently with plague in gerbilles ; up to the present, none of these animals have been found plague-infected. Ground squirrels and suricats (*Suricator suricator*) die out during a wave of infection concurrently with the gerbilles, but do not appear to play important rôles in spreading or perpetuating the infection.

" Our experience goes to show that, although the original agent in conveying plague-infection from the domestic rat to the wild fauna was probably the striped mouse (*Arvicanthus pumilio*), the animal of greatest importance in perpetuating and spreading the infection amongst the wild rodents of the Union is the gerbille. It is to be noted, however, that wherever these animals exist in numbers, multimammate mice, ground-squirrels, and spring hares are, as a rule, also common ; the conditions of soil, herbage, and insect life which favour any one of these species favour all. Evidence of recent infection is easier to find, and in actual practice is more frequently found, in gerbilles than in any of the other animals mentioned. Gerbille burrows are easily located, and the animals frequently die in their burrows. Animals of the other species mentioned usually die in the open and their carcasses are in most cases quickly eaten or carried off by mongoose, suricats, wild cats, or birds of prey, or covered up and disposed of by ants."

KHARTOUM. **Report on the Health and Sanitation of Khartoum, Khartoum-North & Omdurman for the Twelve Months ending September 30th, 1922.** [BOUSFIELD (L.), M.O. of Health, Chief Sanitary Officer.]—42 pp. With 3 folding charts. Khartoum : Sudan Printing Press.

In the year under report an epidemic of malaria, which comprised about 10,000 cases, occurred in the city of Khartoum and neighbourhood. Out of 1,367 notified cases, 1,071 were considered to be local infections. At least 1,000 of these occurred in September. During the year the rainfall was in the neighbourhood of 400 mm., whereas the average for 20 years was only 120, and there were extensive flooded

areas, a quarter of Khartoum being under water for 2 or 3 weeks at a time. The mosquito which caused the outbreak was *A. costalis*. The mortality from malaria itself does not appear to be very high, only 7 deaths, or ·5 per cent. of the number of cases notified, but the recorded deaths in August for the town and neighbourhood were 212 and 458 in September, making a total of 670, against the average mortality of about 300. Most of the deaths occurred amongst young children and elderly people.

Communicable Diseases Notified.	Civilian.	Egyptian Army.	British Troops.	Imported.	Local.	Total
Malaria (including B.W.F.)	679	200	192	296	1,071	1,367
Small pox	45	2	—	22	47	69
Typhoid and Paratyphoid	5	3	—	3	8	11
Dysentery	28	15	2	16	45	61

An interesting chart is given of the rainfall, the number of all anophelines found and the total primary malarias, which we are unable to reproduce.

" It will be noted that the crest of the rainfall is some 3 weeks before the crest of the prevalence of adult anopheline mosquitoes, while the anopheline infestation crest in the municipality occurred a week before the highest crest, the higher crest being due to the number of infestations discovered when the outlying districts could be dealt with, while the crest of the malaria wave occurred 8 weeks after the rainfall crest and 4-5 weeks after the adult mosquito anopheline infestations crests."

As regards climatic conditions :—

" From July 18th to August 30th the relative humidity was usually well over 70, reaching 100 on August 28th.

" From August 30th to October 28th, it fell and was usually below 60, while from 22nd October to the end of November it was usually well below 40.

" The maximum temperature ranged between 90°—95° F. during August, and about 100° F. in September and October, falling some 5 degrees during November. . . . .

" The rapid fall in number of cases is thus about 12 days after the relative humidity reached 40 or below, and this period we may roughly take as the incubation period of malaria. . . . .

" The following deductions so far appear to be correct under local conditions.

" (1) Multiple breeding places in a controlled area are essential for an epidemic.

" (2) Relative humidity at or above 60 is also necessary for great mosquito production and for the carriage of malaria to any degree.

" But malaria can be carried when the relative humidity only reaches 32-35 for several successive months, even occurring with a relative humidity of only 10. Latent malaria has to be considered in this connection and previous prophylactic quinine."

[The evidence for this statement is weak and it opposes other authorities.]

" (3) A mean maximum temperature of between 85-100° F. is suitable for carriage of malaria, but 23 primary malarias occurred in the month with mean maximum temperature of 105·4° F. with a mean minimum of 91° F., and 11 in a month with mean maximum of 106·2° F. with a mean minimum of 93° F.

" (4) The nearer the ratio of anopheline to culex reaches parity in August, September, October and November, the more likelihood of an epidemic, but this in no way holds good for the first 5 months in the year, when parity is often reached or the ratio of anopheline infestations exceeds those of culex.

" (5) Culex infestations run up rapidly in June and July with the commencement of the rains, reaching their maximum usually in August far outnumbering the anopheline. The anopheline increase is usually in September, in bad years earlier.

" The culex increase starts quite a month earlier than the anopheline.

" These deductions are based on purely local figures and the anopheline is practically exclusively the Pyretophorus costalis."

NIGERIA. **Annual Medical and Sanitary Report for the Year 1922.** [MONTGOMERY (H. B. S.), Acting Director, Med. & San. Service & CAMERON-BLAIR (M.), Deputy Director, San. Service.]—76 pp. 1923. Lagos: Printed & Published by the Govt. Printer.

The writer of the Sanitary Report gives an interesting account of the work done during the year. The following extracts give an idea of the document as a whole.

" In 1901, the Europeans at Lokoja were housed in wooden bungalows resting on iron pillars, which latter, in their turn, were bolted on the top of cemented brick pillars rising from the ground. The iron pillars, halfway up their length, were collared with iron bands, presenting on their upper surfaces concave rings surrounding the pillars. Those circular concavities were kept full of water in order that white ants might be barred from the wooden bungalows. The white ants were barred all right, but the water in the concave rings swarmed with mosquito larvae; as things were, it was impossible to assure the regular oiling of the water in the rings; the chronic loss of service among the Europeans (both civil and military) caused by incapacity due to malarial fever was little less than 50 per cent.; the cause of this was fully represented, but it took months of medical agitation to secure the filling in of the iron rings with cement. Further south, some years later, the present reporter encountered living in a bungalow raised on pillars from the grounds a well-known and widely respected European who permitted his house-boys to use habitually the surface of the ground under his bungalow as a common latrine without reprimand or protest. About the same time, there were known to the reporter respectable African coast natives who permitted their wives and children to leave their entire dejecta standing within chamber-pots within their houses for days on end without removal, the chamber-pots being not even covered. As time went on, conservancy became gradually effective, so also did anti-mosquito measures; more attention was devoted to the quality of water-supplies; town markets were more closely supervised; and the racial distribution of the population of stations was regulated. Progressive improvement followed all this; so much so that many years ago it had become possible to formulate this rule, to wit: 'Sanitary measures may be pronounced successful when it can be said of a station that the majority of its sick are importations from without and not habitual inhabitants of the station itself.' . . . .

" Much sanitary progress can be, and has been effected among the higher tribes, who live under relatively high forms of administration. This is true of the people (of many of them, anyhow) who live under the

Alafin of Oyo: it is also true of the people living under the Northern Emirs, and of those living under a good many smaller independent magnates.

"Examples of progress effected among numerous groups of such people since the beginning of the century are as follows:—(1) Effective isolation of their sick relations and dependants whom they know to be suffering from infectious disease; (2) Application of the usual preventive measures against mosquitoes and flies; (3) Setting out new towns for themselves on reformed lines suggested by political, medical, or sanitary officers; (4) Active measures taken for the safeguarding of their water-supplies; (5) Willingness to reform their methods of disposing of human and other ordure and of getting rid of rubbish, when the wisdom of doing so is proven to them; (6) Taking active part in the pushing of vaccination; (7) The setting-up of extra-mural markets and caravansaries; (8) Keeping long crops away from their compounds, and sometimes pushing them out well beyond the town boundaries as well. . . . .

"European food is now procurable from Cold Storage at Lagos, at Calabar and Port Harcourt, and it may be realised that the innocent African may be safely trusted to keep his own end up when it is mentioned that although the Nigerian coast, rivers and streams teem with excellent fish it is, not infrequently, cheaper to buy salmon or turbot from the Cold Storage Company than to purchase fresh fish from the markets.

"The setting-up of aerated water factories and of ice-plants is slowly but steadily extending. All this must be reported as progress. But the physiologist—and, a fortiori, the pathologist—cannot regard such progress as more than a mixed blessing. In Nigeria as in the tropics generally, most Europeans eat and drink more than is good for them: unusual facilities for procuring abundant food and drink augment this proclivity and bring about chronic over-absorption in many individuals. It is for this reason that the proverbial "West African Chicken" has been and remains an unmixed blessing: its ubiquity renders it an unfailing source of supply, while its toughness and indigestibility defy over absorption, with consequent overloading of the system."

SIERRA LEONE. **Annual Medical and Sanitary Report for the Year 1922.** [BERINGER (F. J. A.), Director of Med. & San. Services; PEACOCK (W. H.), Acting Deputy Director, Sanitary Service.]—75 pp. With 3 figs. 1923. Freetown: Govt. Printing Office.

	Population 1921 Census.	Birth Rate.	Death Rate.	Infantile Mortality Rate.
Freetown	44,142	16·9 per 1,000	26·3 per 1,000	418
Colony other than Freetown ...	41,021	20·2 ,,	21·2 ,,	217

Malaria.

"House to House Inspection.—92,642 inspections of houses and compounds were carried out during the year, resulting in the discovery of 373 mosquito breeding places. 373 prosecutions followed, with convictions in 330 cases. The convictions realised £81 6s. 6d. in fines, making an approximate average of 4s. 11d. per case."

Twenty wells were closed down during the year. The number remaining untreated is doubtful. *A. umbrosus* was found breeding in one place in Freetown ; its origin remains a mystery, as it is not a well-known local species.

Prof. BLACKLOCK, of Sir A. Jones' laboratory, made investigations into the diet at the Freetown jail and came to the conclusion that the outbreak of beriberi was due to the overcooking of food and the deterioration of rice by age and storage. There were 12 deaths during the year amongst the prisoners, which brings the death rate from this disease up to 43·5 per cent. Tailors in Freetown appear to be more susceptible to beriberi than other traders.

The report contains an article by Prof. BLACKLOCK on the prevalence of tsetse flies in the neighbourhood of Freetown. The conclusions arrived at are given below :—

" 1. The breeding grounds of *Glossina palpalis* are not so strictly limited to the immediate vicinity of water as has hitherto been thought, they may occur quite independently of fresh water and at least a quarter of a mile from sea water.

" 2. Although *Glossina palpalis* is to be found in considerable numbers in mangrove swamps and may travel in these to a distance of at least half a mile from dry land, the swamps do not constitute a breeding ground of the fly.

" 3. The pupae of *Glossina palpalis* do not hatch when subjected to daily flotation on sea water.

" 4. The ground around the trunk of oil palms (*Eloeis guineensis*) which have not been stripped of their lower petioles constitutes an excellent breeding place for *Glossina palpalis*.

" 5. *Glossina palpalis* can breed in localities in which, practically, the only tree is the oil-palm.

" 6. Stripping the oil-palm of the lower petioles would suffice to destroy the breeding ground in such localities."

KENYA COLONY & PROTECTORATE. **Annual Medical Report for the Year ending 31st December, 1921.** [GILKS (John L.), Principal Med. Officer.]—175 pp. With 4 figs. London : Printed by Waterlow & Sons, Ltd., London Wall.

The year 1921 was a highly satisfactory one as regards epidemic disease. There was an outbreak of smallpox on the Tana River ; statistics in that part of the world are extremely vague, but probably about 200 deaths occurred. Two undoubted cases of kala-azar occurred in the country, one in an askari's wife ; both cases came from the northern frontier, between Kenya and the Soudan. A few cases of typhus continued to occur in the Colony. The King's African Rifles Medical Service has been reorganized during the year. Probably the most important event is that a Public Health Bill has received assent and is now in operation. From this we quote the following paragraphs :

" The Ordinance states that ' there shall be for the Colony and Protectorate a Department to be known as the Medical Department, which shall be under the control of the Principal Medical Officer, and the functions of the Department are specified to be as follows :—

" ' To prevent and guard against the introduction of infectious diseases into the Colony and Protectorate from outside ; to promote the public health and the prevention, limitation or suppression of infectious, communicable or preventable diseases within the Colony and Protectorate, to advise and direct local authorities in regard to

matters affecting the public health ; to promote or carry out researches and investigations in connection with the prevention or treatment of human diseases ; to prepare and publish reports and statistical or other information relative to the public health, and generally to carry out, in accordance with directions, the powers and duties in relation to the public health conferred or imposed by this Ordinance.'

" The Ordinance is comprehensive, and such matters as administration, notification, prevention and suppression of infectious diseases, venereal diseases, the Regulation of Ports, leprosy, prevention of smallpox and the prevention and destruction of mosquitoes are dealt with in full and will require but little elaboration by regulations, while in Part IX, ' Sanitation and Housing,' it is laid down in detail what acts or things may be considered to be nuisances and powers are conferred with regard to the abatement of the same, not only in townships, but wherever they may occur. With regard to most matters, however, the Ordinance is not detailed, but instead wide powers are conferred on the Governor with regard to the promulgation of regulations. . . . .

" The general duties of local authorities are laid down in Section 14, which is as follows :—

" ' It shall be the duty of every local authority to take all lawful necessary and under its special circumstances reasonably practicable measures for preventing the occurrence or dealing with any outbreak or prevalence of any infectious, communicable or preventable disease, to safeguard and promote the public health, and to exercise the powers and perform the duties in respect of the public health conferred or imposed on it by this Ordinance or by any other law.'

" This section marks progress. Previous to its enactment there is no evidence to be gathered from the laws of the country that the care of the public health of an area was incumbent on any local authority save, perhaps, in the case of a Municipality. Powers there certainly were, but no duties had been laid down or obligations imposed."

Plague.—" With regard to the incidence of the disease in rats, it is worthy of note that at the Government station of Kakamega no month passed without one or more plague-infected rats being found in some part of the station."

The report gives some extremely interesting details concerning the rats of the colony generally, particularly the northern portion of the Kavirondo country.

" The results of the rodent survey in North Kavirondo may be summed up as follows :—

" It was found that in the huts in the north-eastern part of the district, i.e., in that portion towards Mount Elgon, there were no black rats but only the ' multimammate.' In that portion of the district no cases of plague have yet occurred.

" Further south, towards Kisumu, and further west, towards the lake-shore, both kinds of rat were found in the houses, while still further south and west the ' multimammate ' rat was found to have disappeared, and the only domestic rat was the black one. It would appear that in this district the black rat is slowly extending his domain, taking his disease of plague with him as he goes. In certain parts of North Kavirondo his advent is so recent that plague is as yet unknown, further south the first advent of plague and the previous invasion of the district by the black rat are still remembered. Nearer Kisumu the advents of both have been forgotten.

" Little more is definitely known with regard to the arrival of the disease in the Lake Basin than that it was there before the Railway reached Kisumu. It may have been there for centuries. It may have arrived *via* the Nile. The route by which the black rat arrived in East Africa is equally unknown, nor do we know whether he was the rat that originally brought plague to the shores of the Nyanza. All that is certain is that he has been in Kisumu for many years (but whether before the advent of the Uganda Railway or not is also unknown), that he has gradually spread throughout the Central Kavirondo district, and is now spreading over North Kavirondo, and that he is, so far as Kenya generally is concerned, the only rat associated with plague. He is also the rat of the Nairobi and Kiambu districts, and, according to native accounts, is not the original domestic rat in these areas. Twenty years ago they did not know of him. They say he came from Nairobi. He may have reached Nairobi either from Mombasa or from Kisumu, and plague also may have come with him to Nairobi from either of these two places."

With regard to the rat fleas of Kenya, the following points are noted :—

" (*a*) The commonest rat fleas in Kenya would appear to be *X. brasiliensis* and not *X. cheopis*.

" (*b*) *X. brasiliensis* would appear to be capable of transmitting plague from rat to rat and from rat to man, as at Kabete in the Kyambu Reserve it was practically the only flea recovered from black rats caught in huts in an infected area.

" (*c*) *X. cheopis* not infrequently occurs in the towns of Mombasa and Nairobi, and in and around the Government Station and trading centre of Kakamega in North Kavirondo, where considerable outbreaks of plague have occurred. On the other hand, *X. cheopis* appears to be rare in the Kikuyu Reserve (Kabete), where cases of human plague have only occurred in a more or less sporadic fashion, and is a very rare parasite of the domestic rat (the ' multimammate ') of North Kitosh, where plague has not yet occurred. Further, *X. cheopis* is but an infrequent parasite of field rats, none of which have so far been found to be infected with plague in this country.

" (*d*) It is only as a parasite of the black rat that *X. cheopis* is of more than infrequent occurrence."

Sleeping sickness.—An increase seems to have resulted from the gradual return of the population to the deserted parts. The question now arises as to what is to be done in the future with regard to sleeping sickness. Is an effort to be made to control its spread and to treat sufferers from the disease or are things to continue as at present, with the constant danger of an epidemic ? There is no doubt that the wise and humane course is to endeavour to obtain some sort of control of the disease. In the past anti-trypanosomiasis measures varied from removal of the whole population to complete absence of measures of any kind. It has been shown in the recent anti-plague campaign in some areas that satisfactory results were obtainable with energy and a carefully prepared scheme of propaganda. The Principal Medical Officer is of the opinion that such measures as providing hospitals nearer the area would have considerable influence on the disease.

7,400 cases of yaws were treated in certain parts of the Colony against more than 500 of last year. This does not include the numbers treated by the missionaries.

A great deal of work has been done in the laboratory, such as preparing vaccine, agglutination tests, etc. As regards the water supply of Nairobi from the bacteriological point of view, it shows periodical and continuous contamination, though the medical examination reveals no change, and so far no outbreaks of water-borne disease have been directly or unmistakably traced to the consumption of water supply.

There is an interesting account of an outbreak of septicaemic and pneumonic plague, which will be dealt with elsewhere.

MAURITIUS. **Annual Report on the Medical & Health Department (1st January to 31st December 1922).** [GILCHRIST (T. B.), Director.] —22 pp. [No place or date of publication.]

" The estimated population of the Colony on 31st December, 1922, was 377,594 . . .

" The birth rate was 37 per 1,000, against 38·1‰ the year before, and an average of 36·2 for the five-year period 1918-1922 . . .

" The death rate was 34·5 per 1,000, compared with a death rate of 40·3 per 1,000 for 1921 and 42 per 1,000 for the preceding quinquennial period."

Enteric Fever.—" It will be . . . easily understood that [with] cases of enteric fever occurring in slums, densely populated, often without proper latrine accommodation, or supervision, and oftener, where latrines are badly constructed, and pails defective, and where the night soil service is badly performed, and [where] owing to [the] present system of dealing with ' Engrais,' . . . discharges are returned to the fields in less than six weeks, . . . late notification and existing conditions prevent the Medical and Health Department from combating the disease in a prompt manner.

" Investigations, bacteriological and chemical, of water supply showed that the supply from Grand River was grossly polluted, and investigations along the whole route convinced me that the causative agent was impure water; so notices were published through the press (all newspapers) of the danger of drinking unboiled water."

Water supply.—" Improvement of the quality of water supply is, in my opinion, the most urgent sanitary reform required here."

Ankylostomiasis.—" The campaign opened on 16th May on arrival of Dr. Hampton, the representative of the International Health Board.

" Owing to lack of a proper Soil Sanitation Campaign, the work was confined to the schools in and around Port Louis and to the prisons at Port Louis and Beau Bassin.

" Much propaganda work of an educational nature was accomplished; 49 public lectures, as well as conferences, were held during 1922.

" 12,643 persons were examined and treated for Hookworm. Literature was widely distributed, including 325 letters, 9,000 pamphlets and 1,688 notices.

" Moka District was selected as the area for Treatment Campaign.

" After investigation as to the best means and type of closet most likely to be suitable for the population, Pit Latrines were adopted, where possible, the Government supplying concrete slabs for same.

" Up to end of December 500 pits had been dug."

MALTA. **Report on the Health of the Maltese Islands during 1922.** [CRITIEN (A.), C.G.M.O. and Superintendent.]—48 pp. 1923. July 31. Valletta, Public Health Office.

Summary of vital statistics for 1922.

Area	Malta	sq. miles	94·870
	Gozo	sq. miles	26·974
Calculated Civil Population	Malta	195,089	218,510
	Gozo	23,421	
Density	Malta	persons per sq. mile	2,056·3
	Gozo		868·2
Marriages recorded in Public Registry	Malta	1,158	1,291
	Gozo	133	
Birth-rate per 1,000—Civil Population			36·41
Crude death rate (all causes) per 1,000—Civil Population			23·74
Average crude death-rate for previous five years			22·68
Number of deaths of children under 1 year of age to every 1,000 live births			261·87
Death-rate from notifiable infectious diseases per 1,000—Civil Population.	Malta	2·10	2·03
	Gozo	1·45	

"*Undulant Fever.*—During the calendar year, 1,102 attacks of undulant fever were reported, viz.: 984 in Malta and 118 in Gozo, against 710 cases in the preceding twelve months. The fatality rate was 5·3 per cent. of the deaths—59 in all—two-thirds occurred at ages 15–45.

"The above figures show that out of every 200 inhabitants of these Islands one contracted the disease during the comparatively short span of twelve months . . .

"The indifference of many to the contraction of a long serious illness affecting men and women during the most useful and productive period of their lives is a cause of serious anxiety. As we have affirmed repeatedly on previous occasions, there is no other disease against which we can protect ourselves more easily and effectively than undulant fever, if only people will not use milk unless previously boiled. If safety were not within everybody's reach perhaps one would understand the reckless attitude taken by so many in this respect. It is the fetish of the unboiled milk. Milk when boiled does not lose any of its nutritive value; if anything, its value as food is increased. It is also a fact that boiling makes milk a reliably safe and wholesome article of diet for infants and adults alike. Carelessness in this respect is criminal, as our health and life and material interests, together with the well-being of all who are dependent upon us, are staked for no immediate or remote benefit."

COLOMBO, Municipality of: **Report of the Medical Officer of Health for the Year 1922.** [PHILIP (W. Marshall), Medical Officer of Health.]—47 pp. With 10 charts, 1 graph, 4 figs. & 6 maps. Colombo: Municipal Printing Office.

As usual, this report is an extremely interesting document; in fact, one of the best that we see.

"The health of the town was, on the whole, satisfactory, the death-rate, corrected for deaths of non-residents which occurred in the hospitals, being 28·8 per 1,000, which is the same as in the previous

year; but for the fact that influenza showed marked signs of recrudescence and caused an increased mortality from pneumonia and other diseases, the general death-rate would undoubtedly have been one of the lowest on record. There was a decrease in the mortality from practically all the preventible diseases, including enteric fever, dysentery, diarrhoea, phthisis and plague.

"The question of autochthonous or locally acquired malaria was investigated at considerable length during the year, as there was an impression abroad, which appeared at first sight to be supported by the hospital records and the experience of medical practitioners, that this disease was being acquired to a large extent within the town. This was, however, found upon investigation to be erroneous. There was, it is true, a marked increase of cases under treatment in the town; but with the exception of a comparatively small number of sporadic cases, these were found to have been infected in other parts of the Island where malaria was unusually prevalent. This conclusion is supported by the evidence of Mr. Carter, the Government Malariologist, who, as the result of an extensive investigation, including the spleen examination of 3,468 children within the town, has recorded his opinion that 'Colombo, and in fact the greater part of the Western Province, must be considered remarkably free from Malaria.' He found the spleen rate within the Municipality to be only 0·69 per cent., which is practically negligible. In this connection attention must unfortunately be drawn to a sensational, misleading, and incorrect leading article which appeared recently in Vol XIX, Part III, of the Journal of the Ceylon Branch of the British Medical Association, which, being the journal of an association of medical men, cannot be permitted to remain on record unrebutted."

Malaria of the town when indigenous appears to be due to the occasional presence of *Anopheles culicifacies* and *listoni*; *A. sinensis* is very common and probably does act as a carrier in certain cases, but it has never been found infected. The former two species are on the whole distinctly rare in the town.

Enteric.—As regards enteric fever the medical officer of health gives some extremely interesting and important figures. It would appear that the death rate from this disease in Colombo is nearly always 30 to 40 per cent. of the reported cases; this is obviously nearly double what it is elsewhere, and there is no reason to believe that this malady is more virulent in Colombo than in other parts of the East. Consequently, the conclusion is that for 179 recorded deaths with the usual death rate of 15 per cent., there must be at least 1,193 cases in Colombo instead of 498, as reported. Therefore, 695 cases of enteric fever have never been notified at all. Classifying these figures according to races it would appear that about 450 are amongst Singalese and about 100 amongst Tamils, the other communities providing the small quota. A spot map of the disease shows that it is very prevalent in the crowded areas and comparatively rare in the better parts of the town. The disease diagnosis is simple continuous fever, and also follows a very similar distribution. Consequently, there can be little or no doubt that these deaths are due to enteric. There is no seasonal variation in the number of cases in Colombo; consequently it is obviously not connected with the water supply, and is probably spread by personal contact. When one considers the conditions under which the disease exists there must be a large number of true carriers and ambulatory cases in the city which are extremely difficult to deal with.

Plague.—There were 136 cases with 131 deaths.

"Early in November information was received from the manager of a large forage store in Slave Island that a number of his workmen were absent, some of whom were stated to have died suddenly in their homes in various parts of the town. The investigation which was immediately instituted on receipt of this information disclosed the following facts. An outbreak of unusually virulent plague had suddenly appeared amongst the rats at this forage store, and had, prior to receipt of the information about the human cases, practically wiped out the local rat population, no fewer than fifty-eight dead rats being found by the Public Health Department staff under the bags of forage. On moving this forage, close to which, and in fact amongst which, the workers had been engaged, the floor was seen to be alive with fleas. A dead squirrel which had apparently come down on to this floor from an overhanging tree in search of particles of grain, and was found in the possession of a cat, also proved to have died of plague. An adjoining forage store and some tenements had also been invaded, and seventeen rats killed by the disease. The numerous fleas, thus deprived of their natural rat hosts, then attacked the human occupants while they were at work during the day time, with the result that six known cases occurred, in addition to which there were three other cases amongst the workers who had previously been attacked, died, and buried on death certificates giving other and unquestionably incorrect causes of deaths, making a total of nine human cases, all of which proved fatal. The unusual virulence of the infection in this small outbreak was confirmed by Dr. Hirst by animal inoculation as previously stated.

"While this investigation was going on, two cases of human plague occurred at Borella, which upon investigation proved to be of the same type as the Slave Island cases, and although the actual mode of transmission could not be ascertained there appears to be no doubt that it had been derived from the same source. It is, perhaps, unnecessary to say that in the face of such a dangerous type of plague as this there was no relaxation in the matter of searching for cases and carrying out preventive measures, and it is believed that no case escaped detection after the commencement of the investigation.

"The conclusion arrived at in regard to this outbreak was that a new and unusually virulent strain of bacillus pestis had reached the town amongst the imported forage, which was obtained for the most part from India, although a certain amount was said to have come from Australia.

"In this connexion Dr. Hirst's conclusion that *X. cheopis*, the plague flea of India, is being constantly imported here from India, is of great significance, and calls for the introduction of the special preventive measure recently recommended, viz., fumigation at the port, with cyanide gas, of all grain and forage imported into the Island.

"Subsequent to the outbreak described above, the same type of disease was found amongst the rats in other forage stores and premises adjoining such stores, but, fortunately, no human cases occurred there as thorough preventive measures were at once adopted."

The case mortality was 96·7 per cent. The disease was extremely virulent and there is good reason to believe that practically all cases were reported.

In the Appendix there is a valuable report by Dr. Hirst on the plague research work done in the Municipal laboratory. A great deal

of the work has already been published in scientific journals, so that it is unnecessary for us to deal with the whole of this valuable contribution. Some points, however, are worthy of note.

"130 specimens of the musk "rat" *Crocydura coerulea* were brought to the laboratory. This insectivore is practically immune to plague. Strictly speaking, it should not appear in the plague returns.

"List of rodents found in Colombo by officers of Sanitary Departments :—

FAMILY MURIDAE.
Sub-family Gerbillinae.
Species *Tatera Ceylonica*.—The Ceylon gerbil. Fairly common around Colombo, found on the Galle Face.

Sub-family Murinae.
Species *Bandicota malabarica*.—The Malabar bandicoot. Common in gardens.
Gunomys gracilis.—The Ceylon mole rat. Common around Colombo in gardens, paddy fields, etc.
Rattus rattus Kandiannae.—The Ceylon house rat. The common bungalow rat.
Rattus rattus rufescens.—The Indian house rat.
Rattus rattus nemoralis.—The large Ceylon tree rat. Only a large form of the last species.
Rattus rattus alexandrinus. } Ship and sewer rats. Fairly
Epimys norvegicus. } common round the docks and not indigenous.
Mus dubius.—The Indian house mouse. The common mouse.
Leggada booduya.—The Southern field mouse. A small white bellied field mouse which should be found in the paddy fields around the town.

As regards the work on *X. Astia*, "an analogy from the epidemiology of malaria may help to elucidate the idea. Till recently Colombo was practically free from malaria-carrying mosquitoes, and also from indigenous malaria. The mosquitoes now present may be represented by three types. *Anopheles culicifacies* or *listoni*, which are dangerous carriers associated with epidemic malaria ; *A. rossii*, which have never been proved to carry the disease, and *A. sinensis*, which only carries it occasionally under particularly favourable conditions. *X. cheopis* corresponds to *A. culicifacies*, *X. astia* to *A. rossii*, and *Pulex hominis* to *A. sinensis*. . . .

"The full range of hosts which *X. astia* can parasiticize is not yet known. It is certainly found on many Ceylon rodentia, including all those in the list given above, and on some insectivores, such as the 'musk rat' *Crocydura coerulea*. It seems certain, however, that *X. astia* is not adapted to such a great variety of hosts as *X. cheopis*, nor is it likely that its distribution is nearly so cosmopolitan as this well-known plague-carrying flea.

"It is probable that it ranges less widely in search of food. The bionomics of *X. astia* have not been investigated in great detail for lack of the time necessary for exact observations. Under average conditions the egg hatches out in about three days, the larval stage lasts about a fortnight, and the adult emerges from the cocoon about the 26th day from the laying of the egg. Very few eggs are laid, or larvae hatched out during the hot, dry weather.

"Its activity increases as the atmospheric temperature falls within the range 80° F. to 70° F, but its average length of life seems shortened at the cooler temperatures prevalent up-country. At high

temperature, 85° F. and over, the flea becomes inert and sluggish in its movements.

"In the months of December and January it may live as long as ten days without feeding or even longer if newly bred. In hot and dry weather *X. astia* like *X. cheopis*, requires frequent meals of blood to enable it to survive for any length of time.

"A comparison between the proportion of *X. cheopis* and *X. astia* found during the hot and cool weathers in Colombo shows clearly that *X. cheopis* is more unfavourably affected by hot weather than *X. astia*.

"Cragg has made similar observations on fleas from Bellary, in Madras.

"It would be useful to ascertain the monthly incidence of both species of flea on rats in the plague area. To obtain sufficient data, however, it would be necessary to devote the services of two attendants to a daily flea collection at the depot.

"I find that *X. cheopis* can only be bred successfully in the laboratory during the cooler months of December and January.

"It would appear, therefore, that the seasonal variations in plague incidence can be attributed to the effect of climatic conditions upon the activities and reproductive power of *X. cheopis*.

"The immunity of Madras from plague may be attributed partly to the fact that the population mainly subsists on locally-grown rice, so that little grain is imported from plague-infected districts, partly to the effect of the long hot weather on the breeding of *X. cheopis*. Plague would probably break out in Madras city if a sufficient number of *X. cheopis* were transported there during the cool weather.

"The observations of Cragg and the writer on the distribution of *X. cheopis* in Madras lead to the conclusion that the long immunity of Colombo from plague must be attributed to the existence of a broad *astia* zone in the hot dry lowlands of Madras, through which infected *X. cheopis* and its eggs, larvae and cocoons had to pass before they could reach Colombo amongst rice and grain exported from South Indian ports.

"The larvae of *X. cheopis* can only be expected to survive this passage during perhaps two months in every year.

"Infected adult fleas would die out within the first few days of being transported in trains carrying foodstuffs across such country."

STRAITS SETTLEMENTS. **The Municipality of George Town, Penang. Health Officer's Annual Report for the Year 1923.** [ROSE (J. Stuart), Municipal Health Officer.]—pp. 22+7. With 1 folding chart. 1924. Penang: C. A. Ribeiro & Co., Ltd., Printers. [Price 50 cents.]

Statistical Summary.

Situation Lat. 5° 24′ N. Long. 100° 1′ E.	
Average elevation above L.W.M.O.S.T....	Town area 12 ft. 6 ins. Country area 25 ft. 0 in.
O.S. Tides rise and fall	9 ft. 0 ins.
Rainfall 1923 (average of three readings within Municipal Limits)	127·14 inches
Mean Temperature 1923	81·9° F.
Maximum Temperature	90·2° F.
Minimum Temperature	71·6° F.
Total area of Penang Island	108 sq. miles

Area within Municipal Limits	9·4 sq. miles or 5,803 acres.
Estimated population (mid-year) ...	128,300.
Density of population	13,649 per sq. mile. 22·1 per acre.
Crude death rate	29·62 per mille.
Infant mortality	155 [figure falling very satisfactorily (1906–380). Two whole-time and 8 part-time nurses employed].
Birth rate	31·39 per mille.
Sterling equivalent of $1	2s. 4d. (approximately)

JOHORE. **Territorial Medical Report for the Year 1922.** [ORME (W. B.), Principal Medical Officer.]—27 pp. 1923. Johore Bahru: Govt. Printing Office.

This report is extremely interesting. Population 282,234, birth rate 36·22, highest amongst Malays, 48·36, lowest among Indians, 13·28. Death rate 29·22. Infant mortality 175·19 per 1,000.

Climatic conditions.—Rainfall varies considerably; in the Southern half of the State it is in the neighbourhood of 80 in., in the north very much less. Temperature, highest maximum 98°, minimum 68°.

There are two kinds of hospitals, the Government and the Estate. The State of Johore provided 3,023 beds, which is one bed for 93 of the population.

"It is with great satisfaction that attention is drawn to the Section on 'Special Diseases,' viz., Black Water Fever, Malarial Fever, Ankylostomiasis, Beri-Beri and Bowel Complaints, under which headings remarkable results have been achieved. Pulmonary tuberculosis, however, increases in its ravages year by year and has become a menace which demands united action throughout Malaya; the remedy is well known, but its rigid enforcement is expensive and would be strenuously opposed by vested interests as increasing the cost of living."

Blackwater fever cases totalled in 1922 7 cases with 3 deaths. During the past 5 years the number of cases have been 61, 59, 34, 33, and 7 respectively.

Malaria naturally produces a large number of cases; it is, however, on the decrease. 1922 produced 3,821 deaths, *i.e.*, 358 less than in 1921, with 2·59 per cent. of deaths to total treated cases in the Estate Hospitals. Government hospitals have a much higher rate, 5·33, probably because people only have recourse to them when *in extremis*.

Most happy results can be claimed in the treatment of ankylostomiasis. The disease is rapidly decreasing in prevalence and in percentage of deaths.

On beri-beri the author makes the following remark:—"One is inclined to think that much of the improvement in the incidence of this disease brought about by the use of accessory foodstuffs, such as wheat-flour, during the days of food control, is being rapidly lost. The Chinese undoubtedly prefer their highly polished Siam rice in spite of its well-known deficiency in vitamines."

Phthisis.—441 deaths were registered from this malady, being an excess of 88 over previous years.

A large amount of work has been done in the laboratories, over 7,800 blood films being examined. Malaria parasites reported—Benign tertian 733, Quartan 497, Subtertian 1,088, mixed infection 117.

The country was entirely free from plague and cholera. Anti-malarial measures.—Some 20,000 dollars were expended and a good deal of permanent work was undertaken, particularly in draining of swamps, filling up of ditches, etc., in the neighbourhood of Johore.

FIJI. **Legislative Council. Medical Department. Council Paper, No. 21. Annual Medical Report for the Year ending 31st December, 1922.** [MONTAGUE (A.), Chief Medical Officer.]—34 pp. 1923. **Suva: By Authority: S. Bach, Govt. Printer.**

Population 162,045. Birth rate 31·86 per 1,000. Death rate 15·93 per 1,000.

"The health of the Colony generally was good, despite the economic depression and the resulting fall in wages. Typhoid fever was the only acute infectious fever that was more than usually active; dysentery was probably less prevalent than in any previous year in the Colony's history; yaws was vigorously attacked by means of the salvarsan compounds and, as the native mother is no longer eager for her child to have yaws, there is hope of the ultimate eradication of the disease. Complete elimination of ankylostomiasis from the population is a more difficult matter, but if the present efforts are continued it seems likely that clinical ankylostomiasis will almost disappear. Salvarsan, mercury, and the absence of non-immune immigrants have greatly reduced the incidence of syphilis."

SARAWAK. **Annual Report of the Sarawak Government Medical Department for the Year 1922.** [CLARK (W. E. Le Gros), Principal Medical Officer.]—17 pp. Kuching: Printed and Published at the Govt. Printing Office.

"The general health of the country has been undisturbed by any serious epidemic during the year. In October eight cases of small-pox were reported from Mukah by Dr. Majoribanks, who went to the affected district in order to take control of the situation. All the cases and contacts were isolated and the necessary vaccinations carried out. No further cases occurred.

"An epidemic of dengue fever began in Kuching during the month of July, affecting the bazaar communities and the majority of Europeans. At the end of the year a few sporadic cases only were noted.

"Influenza, which may be regarded as endemic, occurred throughout the year in a very mild form. Among the native communities, tuberculosis and yaws command attention by their prevalence. With regard to tuberculosis, it will be noted that over 30 per cent. of the deaths occurring during the year at the General Hospital, Kuching, were due to phthisis.

"The treatment of yaws by injection of novarsenobillon is increasing in its application, and it is anticipated that there will be considerable progress in this line during the year 1923"; 2,473 injections were given.

An alarming increase in the number of lepers is reported. A new leper settlement is, however, nearly ready.

An interesting note is given on the use of a mixture of carbon tetrachloride and oil of chenopodium as an anthelminthic.

"The results of the treatment have been tabulated below. It has been found that carbon tetrachloride alone is a fairly efficient anthelmintic for Ascaris as well as for hookworms, but in combination with oil of chenopodium it has a much higher efficiency and practically never fails. This combination is believed to be somewhat more effective than carbon tetrachloride alone for a pure hookworm infection also. Doses up to 1 drachm of carbon tetrachloride alone are being given to adults. Formerly m. 80 were frequently given, but cases that were resistent to 1 drachm were usually found to be equally resistent to the larger dose. The dose is given first thing in the morning before eating and no purge is given."

A large amount has been done in the pathological department, particularly on blood smears and examining faeces for helminths.

NEW SOUTH WALES. **Report of the Director-General of Public Health, New South Wales, for the Year 1922. Including a Report on an Outbreak of Plague at Sydney, September, 1921–July, 1922.** [ARMSTRONG (W. G.), Director-General of Public Health.]—pp. v+ 139. With 2 graphs & 1 map. 1923. Sydney: Alfred James Kent, Govt. Printer. [Price 6s. 9d.]

"Plague outbreak at Sydney, 1921–22 (Report, pp. 31–52).—

"The outstanding event of the year in connection with public health was the outbreak of plague, which, beginning in the latter weeks of 1921, continued throughout the first half of 1922. Sydney was the only locality in the State affected. During the outbreak thirty-five human beings were attacked, of whom ten died. Plague patients were treated at the Coast Hospital. The first human case occurred on 29th November, 1921, and the last on the 9th June, 1922. The number of plague rats found was 148. Two infected cats and a guinea-pig were also found. . . .

"The lessons derived from the outbreak recapitulated and emphasized those taught by the 1900–1909 outbreaks, namely, that the disease is not spread by human beings but by rats; that the best methods of prevention are those that aim at rendering premises incapable of occupation by the rat tribe; and that next to this it is most necessary to wage an exterminatory war against the rat population, particularly in neighbourhoods immediately adjoining those on which plague rats have been found. . . .

"*Fumigation by HCN Gas.*—For the first time probably in dealing with an extensive outbreak of plague a very wide use was made of hydrocyanic acid gas in the disinfestation of infected buildings. Seventy-seven different buildings were dealt with by this method with the most satisfactory results. The gas invariably destroyed all vermin in the buildings treated, and its application was found to be both convenient and rapid. By the enforcement of very thorough precautions the use of this method was not attended by any fatal accident to human beings. . . .

"*Hookworm infection.*—The State has been for twelve months acting in co-operation with the Commonwealth and the International

Health Board (Rockefeller Institute) in carrying out a campaign against this disabling and distressing, though not necessarily fatal, disease. It chiefly affects children of the school ages. A survey has been made of the whole susceptible area, and the amount of disease present has been ascertained. All known patients have been treated once, and further treatment is now being supplied. Special arrangements have been made for the routine intermittent treatment of aborigines, who are, owing to their habits, very susceptible to this disease, and form a reservoir from which it spreads to the white population. Every effort is also being made by the Aborigines Protection Board, working in collaboration with my Department, to provide decent sanitary accommodation at the several aborigines stations and to enforce their proper use by the coloured populations. . . .

"Notifiable infectious diseases (p. 18).—

"*Typhoid fever.*—The State experience as regards the prevalence of notifiable infectious diseases was very favourable in respect of all diseases. The typhoid fever experience was particularly satisfactory. The number of cases notified (706) is the lowest ever recorded in New South Wales. Broken Hill furnished almost the only exception to this generally satisfactory state of affairs, that city yielding 115 cases of typhoid fever, or about one-sixth of the total of the whole State. For many years the incidence at Broken Hill has been higher than almost anywhere else in the State, and this is considered to have been in part, at any rate, due to unsatisfactory methods of treatment of excretal matters in that town. On more than one occasion this Department has offered general free anti-typhoid inoculation to the inhabitants of the city of Broken Hill, but the offer has never been taken advantage of."

QUEENSLAND. **Annual Report of the Commissioner of Public Health to 30th June, 1923.** [MOORE (J. I.), Commissioner of Public Health.]—24 pp. 1923. Brisbane: By authority: Anthony James Cumming, Govt. Printer.

Population, 790,239. Birth rate, 25·53. Death rate, 9·14. Infant mortality, 50·5 per 1,000 births.

Ankylostomiasis, only 11 cases were notified.

Plague.—Four individuals of the gray rat (*norvegicus*) were found infected with plague, the first in July and the last three in October, 1922. Flea investigations were continued. What are known as sentinel guineapigs are used in several areas in S. Brisbane in order to attract the fleas in rat-infested buildings. From 23 rodents and 2 guineapigs 132 *X. cheopis* were obtained, 10 *C. canis*, 1 *C. fasciatus*, 3 *P. irritans*.

Much good rat-proofing work has been accomplished, with the result that rubble walls under wharves, which in the past afforded a natural and secure habitat for rats, now no longer exist; these prevented trapping or the laying of poisoned baits. At the present rate of progress the completion of the whole area should only be a matter of time, and then safety will be ensured against a reinvasion of plague carriers.

Enteric fever is still very prevalent. 200 cases were notified in the Metropolitan area and 258 from the districts. The writer considers that most of these were fly-borne.

British Guiana. **Report of the Surgeon-General for the Year 1922.** [Kelly (P. James), Surgeon-General.]—90 pp. 1924. Georgetown, Demarara: "The Argosy" Company, Ltd., Printers to the Govt. of British Guiana.

The following extract is taken from the report of the laboratory work for the year.

"*Ankylostomiasis.*—It is worthy of note that the proportion of stools showing ankylostome ova and the proportion of post mortems yielding adult worms show a material increase in recent years since the departure of the Rockefeller Commission.

"Nearly every specimen of faeces sent to the Laboratory is examined for ova as a routine measure. In 1922, out of 698 stools from separate individuals thus examined, no less than 305 or 43·7 per cent. showed the presence of ankylostome ova. Further testimony to the prevalence of this infection is obtained from experience in the post mortem room during the past year.

"Moreover, an appreciable number of the cases which harboured these parasites were domiciled in Georgetown, a disquieting circumstance when it is remembered that these ova are not eliminated by passage through the septic tanks which have been installed about the city."

Minett (E. P.). **A Brief Review of the Public Health Statistics of the Colony.**—*British Guiana Med. Annual for 1923.* pp. 137–147.

"The total population of the Colony [British Guiana] shows an increase of 16,607 up to the year 1915, but a falling off of 5,101 from 1915 to 1920, so that the total increase for the nine years from 1911 to 1920 is reduced to 11,506. The report of the census taken in 1921 is not published, but it is understood that the actual population of the Colony as shown by the census is considerably below the estimated population. . . .

"The birth-rate for the year 1920, given as 31·9 per 1,000 of the estimated population, shows an increase of 3·1 during the nine years from 1911, but of this only an increase of ·6 has been added since 1915. The highest birth-rate recorded during the period under review is that of 34·6 in 1913. . . .

"The figures for 1920 show a decrease of 6·1 over the death-rate for 1911, but a decrease of only 2·1 over that of 1915. . . . .

"The infant mortality tables show a very gratifying decrease of 81 deaths under one year per 1,000 births as regards 1911 and a decrease of 36 per 1,000 over the year 1915. . . . .

"The figures show a slight decrease of 1 per 1,000 for the whole colony, ·7 per 1,000 for the City of Georgetown, and 1·7 for New Amsterdam as regards diarrhoea, dysentery, etc., but this decrease is negatived by an increase in the death-rate for enteric fever. For this disease there is an increase for 1920 over the 1911 figures of 0·1 for the whole colony, 0·2 for the town of New Amsterdam, and 0·5 for Georgetown."

There is a decrease in the pneumonia, diseases of the chest and tuberculosis, whereas filariasis is on the increase in the crowded wards of the city.

WISHART (W. de W.). **Some Aspects of the Sanitary and Public Health Problems of Georgetown.**—*British Guiana Med. Annual for 1923.* pp. 43–52.

The author gives a very clear account of the sanitary situation in Georgetown. He points out that the major works of sanitation are three in number, and concern drainage, water supply and a sewerage system. They are arranged in what he considers to be the order of their importance.

As regards drainage the author points out that the town is situated 4½ feet below high water level; consequently the only time in which drainage is possible is in the inter-tidal period. Considering that this only allows of 4 ins. of rainfall in 24 hours, it stands to reason that the town may be water-logged, but opening of the sluices generally removes the water fairly rapidly.

The water supply is generally derived from the rainfall and a subsidiary supply from an impounded river, which is quite unsuitable for a drinking supply; at certain times of the year this water is actually superior bacteriologically to the drinking supply. There can be no doubt that a properly protected and adequate supply is one of the necessities of the town.

Considering the difficulties of drainage the sewage water removal system is not a cheap proposition, but is one which must come if the sanitation of the city is to be improved. It is pointed out by an engineer authority who visited the town that it is eminently suitable for the compressed air Shone's ejector type of drainage and there appears to be no serious difficulty in the way beyond expense.

Turning to the minor points, anti-mosquito measures are undoubtedly necessary, screening of the water-vats has been carried out more or less carefully, oiling of cesspits has brought about very considerable improvement in the decline of the number of culicines in the town; the removal of rubbish has also been considerably improved. Recently the Health Officer's suggestion for small light household dustbins in place of the larger ones stationed in the streets has been adopted.

A new abbatoir is required and regulations concerning the milk supply. At the end of the report there is an extremely interesting note appended by the editor, that the recommendations made in the above report have been adopted and a loan floated in order to carry them into effect.

TRINIDAD & TOBAGO. Council Paper No. 70 of 1923. **Health Conditions, 1922. Administration Report of the Medical Inspector of Health for the Year 1922.** [DICKSON (J. R.), Medical Inspector of Health.]—12 pp. 1923. Port of Spain: Govt. Printing Office, 2, Victoria Avenue. [Price 6d.]

Summary of vital statistics.

Population estimated to mid-year	371,105
Area of Trinidad (1,862 sq. miles), Tobago (114·40 sq. miles)	1,976·40 sq. miles
Density of population	187 per sq. mile
Total number of births registered	11,925
Birth-rate per 1,000 of population	32·1
Total number of deaths registered	8,451
Death-rate per 1,000 of population	22·7

Natural increase, *i.e.*, excess of births over deaths	3,474
Total number of still births registered	1,006
Number of deaths of children under 1 year ...	1,665
Infantile mortality rate (per 1,000 births)	138
Notifiable Infectious Diseases—Total death-rate per 1,000 population	3·16
Malaria, death-rate per 1,000 of population ...	2·25
Enteric fever, death-rate per 1,000 of population	0·53
Dysentery, death-rate per 1,000 of population ...	0·56
Diarrhoea and enteritis, death-rate per 1,000 of population	1·77
Pulmonary tuberculosis, death-rate per 1,000 of population	1·13
Bronchitis and Broncho Pneumonia, death-rate per 1,000 of population	1·47
Pneumonia, death-rate per 1,000 of population ...	1·22
Nephritis and Bright's Disease, death-rate per 1,000 population	1·40
Cardiac Diseases, death-rate per 1,000 of population	0·92
Ankylostomiasis	0·77

GRENADA. **Report and General Abstract of the Registrar General of Births, Deaths, and Marriages for the Year 1923.** [FERGUSON (Herbert), Registrar-General.]—16 pp. 1924. St. George : Govt. Printing Office.

Estimated population at 31st December, 1923, 68,086.

Birth-rate was 38·58 as against 29·50 for 1922.

"The death-rate per 1,000 was 16·6, as compared with 18·8 in 1922. The death-rate of 16·6 per 1,000 is the lowest so far recorded in the annals of the Colony. The low death-rate has coincided with a year of deficient rainfall," although "an examination of death-rate in relation to volume of rainfall over the past twenty years does not reveal any striking relativity between the two. . . . . It is equable distribution of rainfall throughout the year that has contributed in a great degree to the low mortality. . . . .

"The death rate, per 1,000 births, of infants dying under one year was 86·79. In 1922 the rate was 114·01. . . . .

"The most conspicuous feature in the causes of death is the reduction in the number of deaths from dysentery, which decreased from 83 to 33, and from diarrhoea and enteritis, which declined from 329 to 283. A contributing factor to this result is, as previously mentioned, equable distribution of rainfall throughout the year and the absence of a period of severe drought followed by heavy rainfall."

BONNE (C.). **L'organisation du Service de Santé et l'état sanitaire dans les colonies hollandaises d'Amérique.** *Presse Méd.* 1924. Feb. 27. Vol. 32. No. 17. (Supplément.) pp. 337–338. With 1 fig.

The writer gives an account of the health establishments of Dutch Guiana and the neighbouring Dutch Islands. Dutch Guiana contains approximately 100,000 inhabitants of mixed origin, negroes, half-castes, Indians, Chinese, etc. The population of the chief town, Paramaribo, is 40,000. The total white population is about 1,000. The death rate in 1920 was 21·2, in 1921 23·8. The birth rate in 1920 was 32·9, in 1921 33. For the islands the birth rate for 1920 was 26·9, for 1921 25·8; the death rate for 1920 was 22·4, for 1921 20·3.

Malaria is more or less prevalent throughout the Colony. It is not a serious matter in the capital nor on many of the estates, but in the interior there are malarious plateaus. Filariasis is a disease of the town; it is unknown in the interior [the same applies very largely to Georgetown in British Guiana]. Ankylostomiasis, leprosy, typhoid, bilharziasis, leishmaniasis, fever allied to dengue, the two dysenteries and pellagra are prevalent. On the other hand there is no cholera, plague, yellow fever, smallpox, schizotrypanosomiasis or relapsing fever known in the country.

The medical service consists of European and native doctors trained at Paramaribo. The general hospital has 700 beds. A special training in tropical diseases is available for the European at Amsterdam and Leyden.

In the Islands there is the usual Government doctor and subordinates for each island.

Curaçao has a population of 30,000 inhabitants with a good hospital. There is not much sickness. Malaria is unknown in the Islands, the rainfall being small.

Souza (G. H. de Paula). **Serviço de Estatistica Sanitaria.**—*Sciencia Medica.* Rio de Janeiro. 1924. Jan. 31. Vol. 2. No. 1. pp. 16–40. With 1 fig.

The aim of the Sanitary Department to keep statistical returns reliable is far from easy of attainment. Census records are rendered inaccurate owing to a large migratory population. Registration of deaths is more perfectly carried out, only 5 per cent., or thereabouts, being unregistered. The Civil Registrar forwards his records weekly, together with the original certificates, to the Health Department, so that the accuracy of the records is checked. Nearly 40 per cent., however, of the deaths take place unattended by medical men, and large numbers are, therefore, uncertified as to the actual cause of death.

15·40 per cent. of the deaths registered in the capital are ascribed to infectious diseases. One of the greatest complaints voiced by the author is of the delay in publishing records, which in some instances do not appear until so long after the event that they are practically useless.*

Souza (G. H. de Paula). **O Estado de São Paulo e alguns dos seus serviços de Saude Publica.** [Public Health in São Paulo.]—*Ann. Paulist. Med. e Cirurg.* 1923. Dec. Year 11. Vol. 14. No. 12. pp. 169–190. With 3 folding plans & 1 map.

An account of public health movements since their inception in 1892 is briefly given, which shows that of recent years development has been rapid. The subject is dealt with under various heads, such as general prophylaxis, the establishment of permanent municipal sanitary stations, hookworm campaigns, suggested modifications of the present system, and financial considerations. The section of general prophylaxis treats of endemic conditions such as malaria, leprosy, syphilis, trachoma, and helminthiasis. This service was started in 1918 with four stations, but now comprises 26 in full working order. A detailed schedule of the work of a permanent municipal health station is given and includes sanitary education, treatment (both curative and preventive) of endemic diseases, especially malaria, trachoma, venereal

* Summarized by Dr. H. Harold Scott.

affections and hookworm, in which the Rockefeller Foundation has aided, the inspection of school-children, provision of a laboratory and the keeping of a stock of vaccines and sera. Modifications are suggested with a view to improving certain public health undertakings, particularly those relating to maternity and child-welfare, industrial hygiene, food protection and housing. These, though excellent in theory, appear to tend to over-elaboration, the Health Directorate being in immediate control of at least 13 different sections each with numerous divisions and subdivisions. The final section of the paper is concerned with financial questions of local interest and application.*

Souza (G. H. de Paula) & Morena (Nicolino). **Suggestões para a melhoria da legislação sanitaria estadual, sobre generos alimenticios.** [Suggestions for Improving the State Sanitary Legislation Relative to the Food-Supply.]—Instituto de Hygiene. São Paulo. 1924. Bol. No. 20. 42 pp.

In their introductory remarks the authors state that the present situation as regards food-protection is deplorable, in the almost complete absence of laws and regulations as to purity. There are several small laboratories, independent of each other, inadequately staffed, poorly endowed, and under no central control. Suggestions are made for remedying this state of affairs by instituting properly trained and authorized inspectors of food; by issuing regulations relative to food preservation, food adulteration, the use of colouring matters; by determining standards of purity for food and drugs, and so on.

Details are given of such regulations applicable to each article—meat, milk and milk products, cereals, condiments, wines, water used in the preparation of mineral waters, etc.; these are on the usual lines.*

Barreto (João de Barros). **Serviços de Saneamento e Prophylaxia no Paraná. Antigos Problemas novos Horizontes.**—108 pp. With 14 plates & 18 text figs. Annexos 21 pp. and 9 pp. 1924. Curityba: Placido e Silva & Comp., Ltda.

This record of the Health Department of Parana is divided into 7 sections. The first is introductory and historical; the second deals with the sanitation of dwellings, disposal of refuse and excreta, and the question of water supply. In some districts there is a piped supply, but in others, e.g., Morretes, the river water is used for drinking, although the river is used also as a sewer and into it is discharged the refuse from a paper factory.

The third section gives an account of the prophylaxis of transmissible diseases. The plan laid down is extensive and aims at dealing with ankylostomiasis, malaria, leprosy, smallpox, venereal diseases, trachoma, the dysenteries, the enteric group and cerebro-spinal fever. For treatment of the first-named carbon tetrachloride has largely superseded oil of chenopodium and is highly spoken of. As regards leprosy 357 cases are recorded amongst a total population of 462,517, or 7·7 per 10,000. In the district of Pirahy the incidence is highest, 6·44 per mille. The usefulness of disinfection for prevention of venereal diseases is well shown by the Dispensary records. Of 832 soldiers who made use of this measure only 3 (0·36 per cent.) contracted disease,

* Summarized by Dr. H. Harold Scott.

whereas of 150 who refused it 27 (8 per cent) suffered. In section IV the question of food protection and purity and the establishment of standards, particularly as regards the milk supply, is considered. Next follows a short chapter on Child Welfare, on the usual lines, of instruction of parents, the provision of health visitors, care in infant feeding, and so forth. Section VI, on laboratories, is very meagre, the work done consisting at present of routine examinations, chiefly Wassermann reactions. Doubtless, if the above-mentioned schemes are undertaken, this branch of the Department will be in much greater demand. The final section consists of statistics and gives also a brief account of educational propaganda work. Verbatim copies of articles on venereal diseases, their nature and prevention, printed in the local lay press are given in the appendix.*

REVIEWS AND NOTICES.

League of Nations. **The Health Organization of the League of Nations.**—39 pp. With 1 map. 1923. Geneva: Information Section, League of Nations Secretariat. [Price 3d.—5 cents.]

The Health Organization of the League of Nations consists of (1) an Advisory Council, which, meeting twice a year, deals with matters submitted by the Health Committee and also may initiate questions for consideration by that committee; (2) a Health Committee, which advises the Council and Assembly and directs the work of the League on all Health questions, reporting annually to the Advisory Council; and (3) an executive Secretariat, which is the Health Section of the general Secretariat of the League.

The work of the Health Department is here considered under four main headings: (1) intelligence; (2) co-ordination of the results of scientific research; (3) international co-operation in great epidemics, and (4) collaboration with other technical departments of the League.

Intelligence.—The work of this section includes (*a*) the general study of epidemiology—the incidence, distribution, and periodicity of particular epidemic diseases, and the collection, collation, publication, and distribution of such information; towards this work the Rockfeller Foundation is giving for five years an annual contribution of 32,840 dollars; (*b*) collection and study of information for standardizing vital statistics and promoting uniformity of administrative records and arranging educational conferences of vital statisticians with the same object; for the latter purpose the Rockefeller Foundation in 1923–4 contributed 31,500 dollars; (*c*) promoting educational intercourse between nations by fellowships and interchanges of public health personnel, to which object the Rockefeller Foundation contributes 60,080 dollars a year for three years. How these instructive interchanges work is thus exemplified:—30 medical officers selected from the health administrations of 17 different countries meet together in London under the wings of the Society of M.O.H. After a week of lecturing they go to the provinces in fours, for four weeks, to study the doings of various local health authorities. Then they reassemble in London for a fortnight to compare and discuss their experiences and to study the sanitation of the Port. Then they go off to Austria for five weeks' observations of the sanitary institutions of that country. Finally they go to Geneva to study the League's health machinery. Or, to give an example of another kind, representatives of 11 countries interested in malaria meet together in Italy for three weeks, to study malaria control under the Italian Health Service.

Co-ordination of Scientific Researches.—The Health Organization does not finance pure research; it confines itself to facilitating the practical

* Summarized by Dr. H. Harold Scott.

application of discoveries already well established—to such matters as the standardization of sera and serological tests and "biological products" of therapeutic value.

International concert in epidemic disease.—One object is to prevent the general spread of epidemics by strengthening the efforts and supplementing the means of the public health authorities of the different countries menaced. This object is exemplified in the work of the Epidemic Commission in Eastern Europe, established in 1920 and still in action. Assistance has been rendered, in Poland and in Greece, in the feeding, clothing, cleaning, and transport of refugees; in disinfection, vaccination, and other quarantine work; and in equipment and supplies of hospitals. Another object, exemplified by the Warsaw Health Conference, is the formulation of principles of sanitary defence in a comprehensive scheme of international conventions to be worked not through diplomatic channels but by national health administrations direct, with the health department of the League as mediator, if necessary. The conventions deal with notifications, exchange of information and publications, definition of limits of infection, full details of measures of prevention and prophylaxis taken and proposed and of frontier inspection and quarantine, etc. An example of still another kind is the commission of experts from Belgium, France and Great Britain, appointed by the Health Committee to investigate the incidence of sleeping-sickness and tuberculosis in equatorial Africa. Other instances of the League's activity in the directions exemplified are the Eastern Mediterranean Inquiry into international action for the prevention of epidemics in the Near East; the Inquiry in Far-Eastern Ports, in anticipation of international concert for the sanitation of that part of the world; the Cancer Inquiry; and an inquiry into malaria prevention.

A. Alcock.

Balfour (Andrew) [C.B., C.M.G., Director, London School of Hygiene and Tropical Medicine] & Scott (Henry Harold) [M.D., M.R.C.P.Eng., London School of Hygiene and Tropical Medicine]. **Health Problems of the Empire—Past, Present & Future.** [No. 5. The British Empire Series.—Edited by Hugh Gunn.]—pp. xxi + 413. With 9 illustrations. 1924. London: W. Collins & Co., Ltd., 48, Pall Mall. [Price 16s. net.]

This book is not a scientific treatise, though it deals with a branch of science and is conceived and constructed in a scientific spirit; it is not a book of reference, though it is based largely on historic records: it is a romance—a romance of humanity sore let and hindered, and often tragically deluded and self-obstructed, in the struggle against disease, but at length winning through, here and there, not indeed to victory but to the means of victory—a romance of irresistible British progress through much apathy and stupidity, from insanitary chaos towards settled sanitary order.

Very properly does the story start with Drake and Hawkins and the rude ship-hygiene of those famous sea-captains through whose venturous constancy this sceptred isle became the keeper of the keys of a British Empire: with appropriate felicity does the prologue intimate how the valuable negro merchandise that good John Hawkins carried from the Guinea-coast carried also, in the womb of time, some troublesome seeds of sanitary problems for the confines of the British Empire of this present and particular survey.

From this suggestive background of the Tudor navy and the slave-trade we are taken all round the Dominions of to-day, and are told at each stopping-place something of how from dubious beginnings it struggled in the direction of salubrity.

Starting with what the authors call the "Homeland," we get a salutary reminder that the infinite dirt in which our forefathers wallowed was not officially repudiated by Act of Parliament until 1848. Thereafter, under the chastening influence of cholera, the popular "ignorance, which finds

not till it feels," became properly submissive to sanitary authority, and now under a Ministry of Health we may indulge a trembling hope than an instructed and enfranchised proletariat may endorse the dictum of Disraeli that the first consideration of a government should be the health of the people. In the summary of the "Homeland" the authors also trace the influence—long retarded, but suddenly accelerated by the malaria discoveries of LAVERAN and of ROSS—of MANSON'S epochal discovery upon medical education and upon the investigation of the aetiology of disease at home.

From the mother-country we pass to the ocean highways and the hygiene of the Navy. Quotations from *Roderick Random* remind us of the horrors encountered by a surgeon in a ship of the line 200 years ago, and the quoted admissions to Haslar Hospital for the years 1758–60—fevers, 2,174; scurvy, 1,146; smallpox, 53; leprosy, 30—serve to illustrate the results. We are told about LIND (1716–94), who discovered for himself (as, indeed, HAWKINS had discovered for himself 150 years before) how to distil fresh water from the sea and knew how water could be purified by means of quicklime, who formulated rules for the prevention of typhus which stand good at this day, who advocated lemon-juice and understood its pre-eminence over lime-juice, and counselled the growing of watercress on blankets, and in many other ways revealed himself as a "great naval hygienist." The works of many good men after LIND are recited, until we come to William BURNETT (1779–1861), who made arrangements for professional instruction of naval surgeons, although the school at Haslar was not established until twenty years after his death. One regrets in this survey of the British Empire to miss here one of the greatest names in its annals—NELSON, who, from his early days in the West Indies to his last long cruise after Villeneuve, was, by his own personal solicitude, singularly successful in maintaining the health of a ship's company.

After the Navy comes the Army and the story of the quickening effect of war upon the sanitary applications of science. From pioneers like MONRO, whose work on army sanitation (1780) has "a wonderfully modern air," and PRINGLE, whose *Observations on the Diseases of the Army* was eulogized by SIMON as "one of the classics of Medicine," we pass a gallery of worthies until we come to the HERBERT Commission after the horrors of the Crimea, to PARKES and his famous *Manual*, to the Army Medical School, and to the distinguished men of the present day and the perfected sanitary organization of the most awful war in history.

Next we go to the West Indies, where we hear a tale that is reiterated elsewhere all round the tropics—a tale of islands wonderfully favoured by Nature but pronounced accursed by white men who had not yet learned how to live there, men who ate "like cormorants" and drank "like porpoises," and perhaps paid too much court to the *nymphae solutis zonis*; men who founded their settlements too near swamps, or among native crowds whose only scavengers were "the vulture, the pig, and the pariah dog"—a tale of appalling death-rates and the white man's grave. Then, if commercial prosperity became assured, hope returned and there came some official recognition of sanitation, and, if prosperity still increased, some degree of sanitary organization. On the other hand, if, as in the West Indies, prosperity declined, public attention would cease to be attracted to sanitary questions, or if attracted would recoil from the expense.

From the West Indies we go to Canada, where the public health became the object of definite enactment in 1832 and municipal and rural sanitation are now, to say the least, as well advanced as in England. It was a Canadian who taught his fellow countrymen, as long ago as 1876, that "public hygiene is the most important matter any community can discuss, for upon it, in its perfection, depend all the powers, moral, intellectual, and physical, of the State."

British West Africa comes next. Here the story begins, very much as in the West Indies, with the tune of the white man's grave; but changes so completely subsequent to the establishment of the West African Medical

Service that the authors now conjecture the West African possessions to be, to sanitary sight, "the brighest jewels in the diadem of Crown Colonies." Though sanitary organization has reached the standard of Research Institutes, the authors give very free expression to their opinion that these brightest jewels are behind French West Africa in the matter of original research. The French "appear to set more value on such work than we do, or, at least, they subsidize it to better effect"; and the authors attribute this differency to the fostering influence of the Pasteur Institute of Paris.

In dealing next with the Union of South Africa the Imperial chord is struck, the Cape being not merely the gate-house of South Africa but the halfway-house to the East. The early records here, as might be expected of a people then mainly pastoral, contain little information about public health, which up to 1883, when the first Public Health Act was passed, was in the hands of the local medical practitioners. At the present time sanitary affairs in South Africa exhibit some inequalities. On the one hand is the elaborate organization of the mines, and the bacteriological work of Spencer LISTER which is of almost world-wide importance; on the other hand "a considerable section of the population—not only native and coloured, but European—lives under conditions of overcrowding and insanitary housing; many of the smaller towns and villages still have dirty and polluted water-supplies; in many centres tuberculosis is a serious scourge; malaria is prevalent and is retarding the development of some of the most fertile parts of the country"; and "the native in the towns is a very grave public health problem."

Little is said of Rhodesia, Nyasaland, and Tanganyika Territory. In Southern Rhodesia malaria and blackwater fever are obstacles to progress; in Northern Rhodesia and Nyasaland sleeping-sickness stands in the background if it be not a vivid menace; Tanganyika, notwithstanding the sanitation of the Germans, is full of malaria and dysentery and has its sleeping-sickness and leprosy anxieties.

Zanzibar is of peculiar sanitary importance as the place where, being also the quarantine station of the territories of Kenya, Uganda, and Tanganyika, three native races, African, Arab, and Indian, mingle. Its early sanitary atmosphere, up to 1876 at least, seems to have been peculiarly noisome, but its sanitary problems have now been brought under control, and its streets, though not altogether fragrant, are conspicuously clean.

Of Kenya Colony the early sanitary history is in some ways like that of West Africa—settlements in the midst of a native population liable to malaria, enteric, dysentery, and periodic mortal epidemics. Its chief town, Nairobi, is an example of how a town should not be built; "like a canker the Indian bazaar, foul, overcrowded, ugly, and menacing" still stands in its midst. In this colony two dramas of Imperial interest are now staged. One lies with great creating Nature, and is concerned with the permanent colonization of the equatorial highlands by men of white race; the other lies in the seamy side of human nature, and affects the status of the uneducated and insanitary Indian immigrant.

Uganda is said to be, in comparison with some parts of Kenya, as a garden to a moor, though in many respects—and apart from the awful tragedy of sleeping-sickness—its sanitary history is similar, and its hygienic problems are similarly complicated by insanitary Indians. It is now devastated by syphilis, though large remedial measures are in progress. Its infantile mortality-rates reach the appalling figures of 600 to 900 per 1,000, and have an ominous imperial interest.

The Anglo-Egyptian Soudan has been fortunate in a sanitary administration chiefly by medical officers of the army, in the presence of the Wellcome Research Laboratory in the new Khartoum, and in the fact that for many years in succession it was ruled by a Governor-General who understood the importance of hygiene. It is now a good example of a vast territory rescued from devastating epidemics; but, as a Mahomedan

country with its annual pilgrimage to Mecca, its sanitary defences must always be kept efficient.

Mauritius is a text from which the authors expound many good lessons. A beautiful island set in the silver sea, a demi-paradise built by Nature for herself against infection, has, as the result of *laissez-faire* in matters of Asiatic immigration, become leased out to malaria, ankylostomiasis, plague, and dirt. These lessees have cost the island its health, its reputation, "thousands of lives and millions of money"; to buy them out—which can be done if its people are really in earnest—will cost some millions more.

The authors give but 16 pages to India, but from these scant pages may be taken three quotations that give birth to volumes of thoughts—some of them unutterable. 1. "The main mass of the revenue is derived from the soil, but the vast majority of the villages receive nothing in the way of sanitary attention." 2. "The Inchcape Commission recommended the abolition of the Public Health Commissioner, a recommendation accepted by the Indian Government but fortunately not by the Secretary of State." 3. "The greatest recent development in India has been the foundation of the Calcutta School of Tropical Medicine." To these quotations may pertinently be added this fourth, taken not from the pages on India but from those on Kenya: "Nothing appeals to a native more than efficient medical attendance. . . . . It is one of the very few . . . . advantages of civilization . . . . for which he has any use. A skilled and sympathetic doctor is more of a civilizing and pacifying force than a company of infantry." These are great solid truths, they should be first principles, wherever the European rules over races whom because of their simpler social garniture we are accustomed to speak of as "uncivilized."

From the 6 pages devoted to Ceylon we learn that although an official sanitary officer has now been nominated to each of the urban district councils there does not exist outside Colombo and some districts in the Western Province any sanitary organization worth the name. "The cry is all for local government, and this in a place like Ceylon is apt to sound the knell of sanitary progress."

Singapore, though it became British in 1819, did not institute a municipal health department until 1887, notwithstanding its overcrowding and its permeation by insanitary horrors derived from China. There was no systematic destruction of refuse until 1887. Proper sewerage is a recent accomplishment. A campaign against malaria was begun in 1911. Malaria, pulmonary tuberculosis, dysentery, and beriberi have been the chief causes of death. But in recent years the necessities of sanitation have been liberally provided, and Singapore has at last "gained a measure of health."

The Federated Malay States afford a brilliant contrast to the usual tale. They had wealth to begin with, but they also started with a good medical service and they understood its value. Thanks to Malcolm Watson and the public opinion that supported him, malaria was banished from Klang and from Port Swettenham and from hundreds of square miles elsewhere. As early as 1900 Kuala Lumpur established an Institute of Medical Research which, quite apart from its own original investigations, has acted as a leaven to the whole medical profession in the States.

The sanitary history of Hongkong—the largest port (by tonnage returns) in the world—is like that of Singapore. At first overcrowding with native labour, a foetid crowd living, 126 to the acre, without drains or a proper water supply; then *laissez-faire* and blank despair; in 1843, for example, 7,893 admissions to hospital and 440 deaths in a garrison of 1,526, to say nothing of mortality among the Chinese; then a desperate penultimate clutch at hygiene, with a realization of the fact that hygiene costs money. Fortunately, as at Singapore, money was forthcoming, and although Hongkong remained unhealthy for many years after a Sanitary Board had been constituted, its sanitary organization, which includes a magnificent Bacteriological Institute, and its public health are now on a par with its commercial prosperity. But an ever-present sanitary problem for Hongkong

is housing and all that that entails, and another perpetual anxiety since the great epidemic of 1894 is plague.

We come next to Australia. In the early days settlers were few and had plenty of room. But the increasing colonists began to herd together in towns, and the towns became cities, and notwithstanding the fine climate the cities became unhealthy. In Perth, in 1882, there were no settled arrangements for sewage. In Victoria, up to 1888–89, according to SPRINGTHORPE, town-cleaning had not ever been attempted, subsoil drainage was a thing unknown, and in Melbourne the beautiful river Yarra had become an open sewer, the side-streets smelt at night like ill-kept cesspools, and the water supply was "variable." Things were just as bad in New South Wales. In 1885 the death-rates from typhoid per 100,000 of population ranged from 32·84 in Western Australia to 169·90 in Queensland. But from the end of the eighties, when at last public attention had been aroused, sanitary progress has been continuous on much the same lines as in Great Britain. As a result the death-rate for the whole Commonwealth had fallen in 1920 to 10·62. In tropical Australia, as in Kenya, a great experiment in the acclimatization of a white race is in progress.

The early history of sanitation in New Zealand is almost a repetition of that of Australia. Regulations for the public health were enacted in 1872, but as late as 1889 the administration of the Act was found to be delusive, and it was not until 1900 that public opinion, awakened by fear of plague, fully realized that the physical welfare of the people is entitled to the first place in the consideration of government. But even under a Cabinet Minister and an able executive there was much obstruction from small local authorities, whose powers, however, were defined and regulated in 1920 under a Director-General of Sanitation. New Zealand has now the lowest infantile mortality-rate in the world; in 1919 it was 45·3 per 1,000 births, as compared with 89 in England and Wales.

The journey ends in the Melanesian Pacific, where the tale is a sad one of introduced diseases, and the health problems are of our own unhappy invention. Even our good intentions have often served the unfortunate islanders ill by interdicting customs which were the very salt of their life, and so depriving them of that indispensable minimum of soul which keeps mind and body from stagnation and from the pale malady of thought.

The rest of the book is devoted to empire diseases, empire burdens, and some other interesting generalities.

Empire diseases are defined as those of a communicable kind that have an obviously harmful effect upon the resources of the Empire, and are specified as ancylostomiasis, cholera, dysentery, enteric, influenza, malaria, plague, smallpox, tuberculosis, and venereal. A clear account is given of each, with particular attention to aetiology, control, and prevention.

The imperial burdens discussed are those laid from the beginning of things upon Eve, alcoholism, and narcotic drugs. As to the first, the authors discuss the causes of infantile mortality and give a sketch of what is being done in various places to assist the expectant mother and preserve her offspring; and along with this there are some qualifying remarks upon the possibility of doing too much for the relief of parental responsibility, and so, in over-anxiety for the welfare of the children, to damage the fathers' teeth. Alcohol, opium, and the other notorious narcotics are discussed without prejudice or overstatement, and in this connexion the authors emit some sensible reflections upon the popular book and film education-cure that is based on the inveterate fallacy that conduct is rectified by mere knowledge, and some equally sensible admonitions upon the present-day education that departs so widely from the wholesome stoical discipline of our forefathers.

The penultimate chapter shifts into the financial aspect of public health, and explains the value of sanitation "from the sordid aspect of finance alone." In days past fear was our teacher and we learnt our sanitation in tears, with many strokes—for example, 54,000 deaths in the cholera epidemic

of 1848. Now, in the comfortable school of finance, we are taught the money value (£5) of a healthy male infant and how that value mounts up to £500 as that infant, continuing healthy, grows up; and the money cost (402 million pounds sterling) of the mortality and disablement caused by plague rats in twenty years in India. Such calculations are very hard to appraise, but we can appreciate the economic lesson taken from the Panama canal under De Lesseps and the Panama canal under Gorgas.

In the last chapter of all the authors penetrate the veil and reveal visions wherein, among other things, we discern a Ministry of Health grown very great, and an army of whole-time auxiliaries; a big museum of hygiene where the citizen would learn not only exactly how his complex sanitary wants are met and how he ought to live, but also how the benefits of sanitation can be imparted to the inhabitants of his tropical dependencies; institutes of original research protected from fanatics and busybodies; children learning the history of public health in school; disease being watched like the weather, and, unlike the weather, its epidemic outbursts being stilled at birth by ordered international machinery.

The authors, both of whom are known to be full of most excellent differences of ability, are to be congratulated on having written a most useful book, unlike other books on hygiene in being extremely interesting. It may have been intended for the well-educated layman, yet it is full of inspiration for the profession, and (seeing how plentifully lacking our medical schools are in arrangements for teaching the history of medicine and hygiene) it should be brought to the notice of every young medical man who intends to practise in the dominions overseas.

A. Alcock.

Correspondence.

Society for Promoting Christian Knowledge. **Tropical Hygiene for African Schools.**—1922. London: S.P.C.K. House, Northumberland Avenue. New York & Toronto: The Macmillan Co.

With reference to the review which appeared in Sanitation Supplement No. 1 (Mar., 1924), p. 64, Canon F. Rowling writes as follows:—

Conference of Missionary Societies in Great Britain and Ireland.
Sub-Committee on African Christian Literature.
London, E.C. 4, 24th April, 1924.

Dear Sir,—In fairness to the Conference and the publishers, may we ask you kindly to make known the facts concerning the above booklet?

It was prepared by a schoolmaster of wide experience in Congo schools, revised and translated into French by Dr. Henri Anet, Brussels, and approved by Government. It has been translated into Kele, Luba, Nkundu, Heso, Kongo, and Kingwana (Swahili) in Congo languages: into Lamba for N.W. Rhodesia; Mauritius; and Malagasy for Madagascar; Swahili for E. Africa, and Ganda for Uganda. All except two in diglot.

In every case it had to be approved by committees or Boards on which keen criticism from men of long and intimate knowledge of African school work is met with. The medical department of the Uganda Government granted £50 towards the version, after approval by the P.M.O. and mission education committee, and Drs. A. R. Cook and J. H. Cook.

Any book which can pass through such an ordeal proves itself as near "gold" as a good currency can well be, even though a little alloy may be in it!

If your reviewer—or anyone else—can produce anything equal or better, within the limits of size and price conditioned by African school needs, we can ensure the warmest welcome to it. No one without intimate knowledge of African village life and work can do this with success.

Faithfully yours,

F. Rowling, Secretary
(ex-Sec. C.M.S. Uganda Mission).